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RAILROAD MAN'S MAGAZINE

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Rail Heroes Honored by Uncle Sam

Moving Sailors by Rail

The Clues at the Crossover
A Mystery Novelette *Complete*

Is Morse Telegraphy Doomed?

Car Shortage and War

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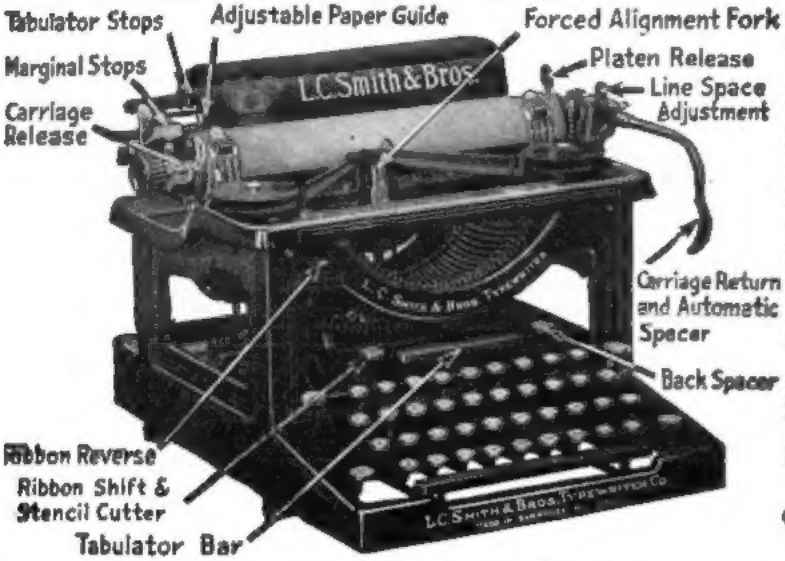

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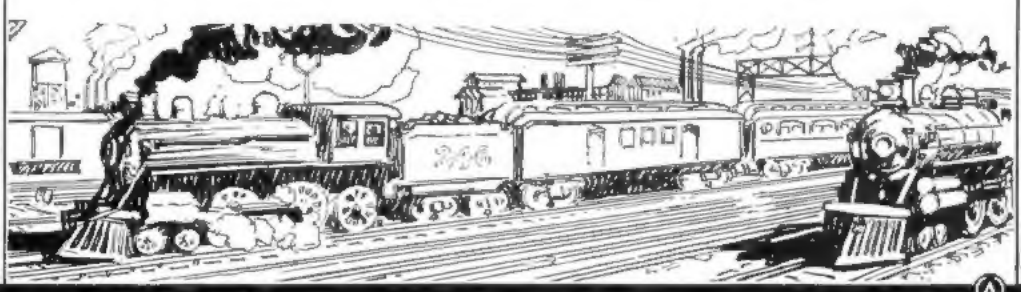

RAILROAD MAN'S MAGAZINE

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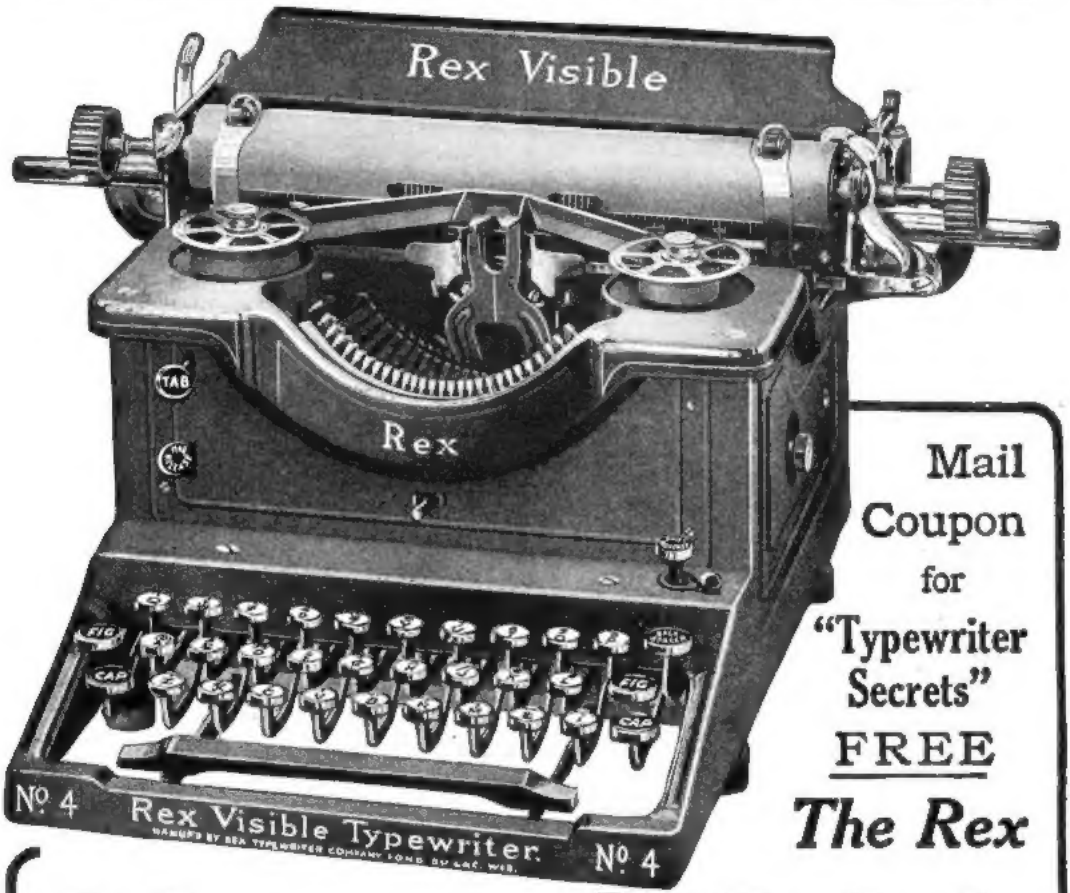

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FA5

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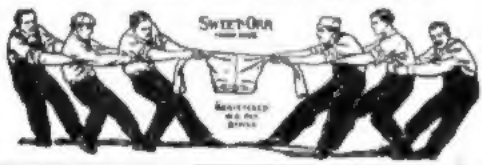

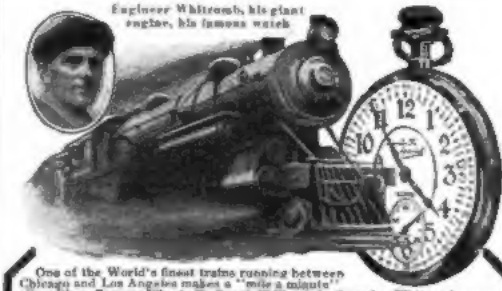

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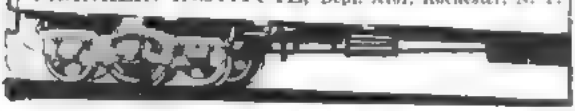

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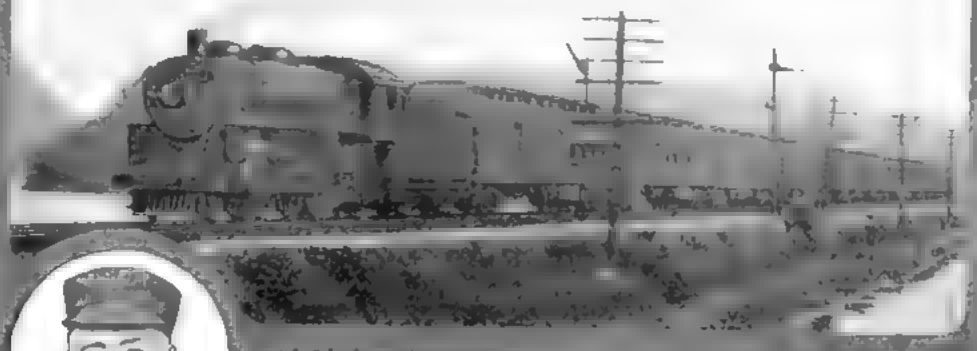

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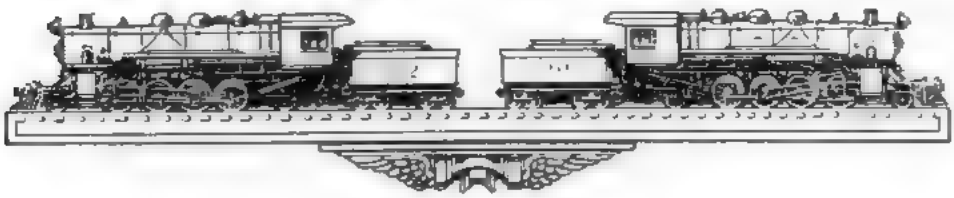


LOSS BY FIRE AND FLOOD.

If All the Damage from Flames Could Be Eliminated Enough Money Would Be Saved to Give Every Engineer a Raise of $800.

WATER CAUSES THE GREATEST HAVOC.

Dayton Catastrophe Cost Railroads in Ohio Alone Not Less Than $10,000,000—Overflow at Kansas City Washed Away 16 Bridges—Missouri Pacific Kept Kaw River Span in Place by Loading It from End to End with Locomotives.

BY C. H. CLAUDY.

FIRE, the life force of transportation, is also its terror, and has been so from the beginning. The first railroad fire of which any record exists dates back to 1831, when the famous engine De Witt Clinton, fired with wood on her trial trip with passengers because coal made so hot a fire the grate bars burned out, proceeded to burn up those who rode on the outside of the coaches which did duty for cars.

First Fire Was in 1831.

Judge G. L. Gillis, an invited guest on that first famous Mohawk and Hudson Railroad train, left a graphic description of this first of all railroad fires

"They used dry pitch pine for fuel," he wrote, "and as there was no spark-

A FEW HOURS PREVIOUSLY THIS STRETCH OF WRECKAGE WAS A FREIGHT TRAIN. HOW MUCH DAMAGE WAS CAUSED TO THE ADJOINING WOODS IS PROBLEMATICAL. THE FIRE HAPPENED ON THE NEW YORK CENTRAL IN THE ADIRONDACKS

From a photo by Brown Bros., New York

catcher in the chimney, a volume of black smoke, thoroughly impregnated with sparks, coals and cinders, came pouring back over the whole length of the train. Each of the outside passengers who had an umbrella, raised it as a protection against the smoke and fire. In the first mile the last one went flaming overboard, when a general mêlée took place among the passengers, each whipping his neighbor to put out the fire as he burst into flame! They presented a very motley appearance at the first station."

From that day to this railroads have suffered from fires of their own causing, although passengers no longer ride on the outside of "coaches," and if they did would hardly be in much danger of being burned alive!

But it is not only fires they cause themselves that railroads fear; fires caused in a dozen ways take a yearly toll from American roads stupendous in its probable aggregate.

It must be only a probable one, for no very inclusive figures are to be had. Of the fifty-four members of the Railway Fire Protection Association, forty-one have made a full report of fire damage. These forty-one companies represent 102,462 miles of road.

In two years' time they report 11,241 fires with a total damage of not quite six million dollars, and this does not include damage done by forest fires they have caused or the damage done by the fires' indirect toll, only the amount of replacement damage, or damages paid to those whose property was burned.

Indirect Loss May Exceed the Direct.

The indirect loss may often be greater than the direct loss. Suppose a road loses half its cars in some great fire.

Would the loss of the amount required to replace the cars be greater than the loss of traffic during the time the cars were being replaced? It might easily be so; and the passengers' fares or freight rates that are not paid to-day cannot be collected to-morrow.

Nor is such a holocaust of cars impossible. At least one instance of such a tremendous loss is known, when one hundred and four Pennsy locomotives were burned in the riots and consequent fires at Pittsburgh in 1877. Many of them were repaired, but the loss of time and earning-power never were replaced.

When a Tunnel Burned.

So it was in the tunnel destroyed by fire on the Southern Pacific last year. A tunnel is an odd sort of thing to burn up, but this tunnel, near Tehachapi, California, was shored for its length of three hundred and sixty feet with redwood arches.

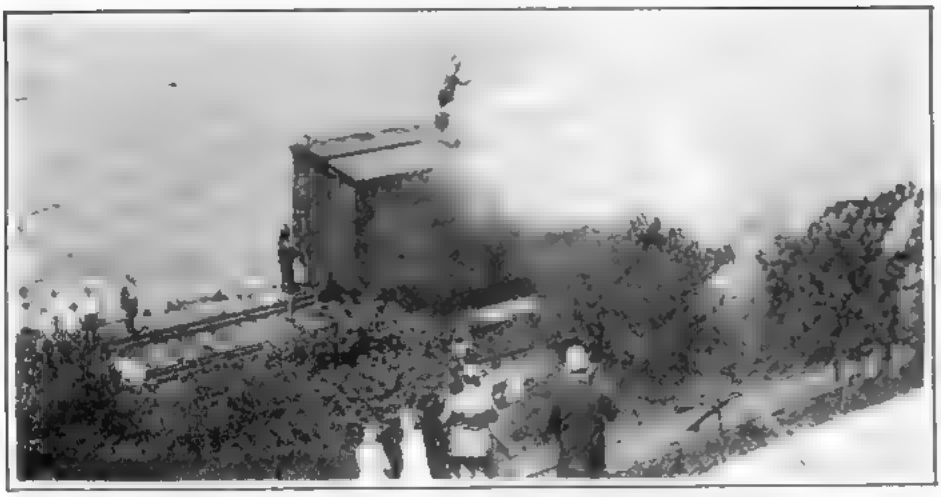
No one knows how the fire caught; it was noticed ten minutes after a train passed through, so a locomotive spark was given the blame. The fire speedily became beyond control, the shoring gave way, the tunnel caved in, and the road was blocked from May 14 to June 9, and then only opened by the construction of a "shoo-fly" road around the mountain.

It cost forty thousand dollars to build the road, and probably as much more to open and concrete the tunnel. But did the almost two months' interruption to traffic not cost the road a much larger sum?

It is for the prevention of the indirect damage as much as the direct that the railroads are uniting in efforts to prevent fires, where they formerly schemed only to put fires out after they started. And the prevention has to take many forms and leads the road into divers and strange activities.

For fire comes not from one or two but from a hundred things. Twenty-four main causes are listed, of which one is "unknown" and one "miscellaneous," leaving twenty-two fiery heads for the fire preventers to fight.

Of these the greatest and strongest is the spark from the locomotive, which not only does enormous damage in causing forest fires—of which more in a moment—but damages the railway itself to al-



FREIGHT-TRAIN WAS WITLESS ENOUGH TO GET AFIRE ON THE CENTRAL'S TRACKS NEAR RIVER SIDE DRIVE AND 108TH STREET, NEW YORK. NOTHING TO IT, THE LOCAL SMOKE-EATERS GOT ON THE JOB WITH NEATNESS AND DESPATCH

From a photo by Brown Bros., New York

most twenty-seven per cent of all its fire losses. Practically every road equips its engines with baffle plates and spark-screens in the smokebox, unquestionably cutting down the damage to a large extent

But it is pretty well demonstrated by the roads themselves in their own reports

WHEN THE BIG STORES OF SULFUR CAUGHT FIRE AT GREENPOINT, LONG ISLAND, THE NEW YORK CENTRAL'S FREIGHT-CARS WERE SERIOUSLY MENACED MANY OF THEM WERE SAVED BY A BARRAGE OF WATER FROM THE NOZZLES OF FIRE DEPARTMENT HOSE

From a photo by Brown Bros., New York

of fire damage that no screen they can use without so cutting down the draft as to be prohibitive of good steaming and time making, will entirely eliminate sparks from the stack large enough and hot enough to ignite dry grass, underbrush, cotton and such inflammables.

The second greatest cause forms the unknown column, which may be spontaneous combustion, incendiarism, carelessness, sparks, all the other causes together, but not traceable. Heating-appliances and flues come third, with eight and a half per cent.

Ashes, hot cinders and hot coals from fireboxes are fourth in the list of fire causes, with a total of only seven per cent.

Smokers Cause $50,000 Loss a Year.

Then, in varying small proportions, come fires caused by conflagrations of adjacent property, electric wires, explosions, forest fires not caused by the road, which, however, burn the roads' property, fusees, friction (hot-boxes) gasoline, oils, *et cetera.* Incendiarism (more than three hundred thousand dollars of fires are reported as from this known cause by these forty-one roads), lighting-appliances, matches, rubbish, smoking (almost a hundred thousand dollars loss in two years from this one cause on forty-one roads; is it any wonder "No Smoking" is a sign which railroads are painting more and more often?), spontaneous combustion, torches, tramps, and trespassers (not incendiaries, but those who build fires and forget to put them out), waste, wooden lockers, and wrecks.

Wrecks, be it noted, cause less fire loss than tramps, spontaneous combustion, incendiaries, and several others. The new steel car is cutting down the fire danger from wrecks, and, of course, is largely eliminating fire damage from heating and lighting fixtures.

When a railroad has a list of fires it can count pretty confidently on just where the repair bill will be heaviest. Rolling-stock suffers the most—one and two thirds millions of the five and two thirds millions lost in property by the forty-one who reported, was on wheels. Next came merchandise in transit, which with cotton, cotton platforms and cotton-spark liability, account for another million.

But even when the roads have counted up these losses, and added the cost of burned passenger-stations and freight-stations, section-houses and hotels, dwellings and roundhouses, storehouses and water-stations, oil-tanks and coaling-stations, elevators and stock-yards, bridges, trestles and approaches, tunnels, and culverts, merchandise in transit and rolling stock and then another half million for miscellaneous loss, for a grand total of almost six millions, or an average of over five hundred dollars for every fire—even then they haven't begun to read their lesson nor give you the answer as to why they try so hard to hold down the terror by flame.

$25,000,000 of Needless Forest Fires.

For there remains yet the terrific indictment against the roads of burning up what is rightly regarded as one of the most important, if not *the* most important, of our natural resources — our forests. Statistics show the railroads are responsible for an average of over twenty-five per cent of all forest fires and as high as sixty per cent in many places.

Twenty-five millions a year are lost in preventable forest fires. One-fourth is charged against railroads. As the railroad itself suffers with every foot of timber burned, is it any wonder they are doing their best to stop the terrible loss?

For the railways not only use timber, but standing timber brings traffic to roads which live by traffic. Burn over the Adirondack or Maine woods region, and where would the summer business go?

In the Pacific Northwest, seventy-five per cent of east-bound freight is forest products—burn the forest and the freight disappears.

Exhaust the timber resources of any

HERE'S ONE THAT NO FIRE DEPARTMENT COULD HAVE SAVED. IF THE CAR HAD BEEN BUILT OF STEEL THIS WOULDN'T HAVE OCCURRED

From a photo by Brown Bros., New York

region, by fire or otherwise, and the cost of ties, telegraph poles and lumber generally materially increases for the road in that section

Oh, it isn't only public spirit, and it isn't only legislation and public opinion, which makes the great roads fight the fire menace from the standpoint of *put out before it catches* rather than after it has started

WHAT HAPPENED TO A NEAR-BY FREIGHT CAR WHEN THAT BIG BLACK TOM ISLAND MUNITIONS EXPLOSION OCCURRED NEAR NEW YORK LAST SUMMER. THE MAKINGS OF A FINE LITTLE BONFIRE, EH?

From a photo by Brown Bros., New York

The law can do something, but not all. It can compel oil burning from April 15 to November 1 in the Adirondack region, and it can compel the railroad to patrol its lines, but much that the roads do is done without any act of any legislature.

B. and O. Maintains Fire Lane in Woods.

For instance, the Baltimore and Ohio has entered into relations with the Forestry Departments of Pennsylvania and Maryland. The road distributes the warning bulletins of the departments, has its station-agents post notices and has standing orders that all employees spread news of fires along the right-of-way by throwing off written notices when such fires are seen. It also has cooperated by clearing certain strips of land and carefully burning the underbrush resulting from the clearing, in order to maintain a fire lane between valuable standing timber and the locomotives.

The New Haven has gone seriously to work to diminish the fire losses in New England, particularly on Cape Cod, where dry, sandy soil gives a peculiar tree-growth which is easily set on fire by sparks. The railroad has acquired and is rapidly clearing a stretch of land at least sixty-six feet wide in tangents and double that on curves.

This land is stripped of all underbrush and low growth by the road and then kept clean by the sectionmen. Trees are left standing, for trees themselves act as a fire screen; it is the underbrush which starts the fire and communicates it to the trees.

In other New England sections railroad fire-patrols are established, and a telephone system, in cooperation with the Connecticut Forestry Bureau, has been installed with stations every eight miles along danger parts of the lines in the State. The road also inspects its spark arresters after every trip and all screen-holes are immediately repaired.

Of course this is but a sample: every road is doing something. Even if it passes through no wooded territory it has plenty of danger to its own and adjacent property to keep it busy.

It would be impossible to list all the fire-prevention methods and activities of even the forty-one roads which reported, not to mention the two thousand or more railroads in the country from which no reports are available. But some of the more prominent work can be taken as typical.

The Pennsy, for instance, maintains a most efficient fire-fighting force at all its great terminals, and in addition has nearly a thousand locomotives equipped to throw water by their own power. These locomotive fire-engines are used not only for putting out Pennsylvania fires, but are available for extinguishing fires anywhere near the right-of-way. Nor is it infrequent for them to be called on.

This is not strange, for the attitude that the road causes all fires within sound of its engine whistles is too common in many rural communities to need comment. But occasionally the road can pour coals of fire while pouring streams of water.

A section foreman on the Ashland Division of the Chicago and Northwestern recently called on a farmer to assist him in extinguishing a small blaze in a tool-house. The farmer sat on a fence, chewed a straw and remarked:

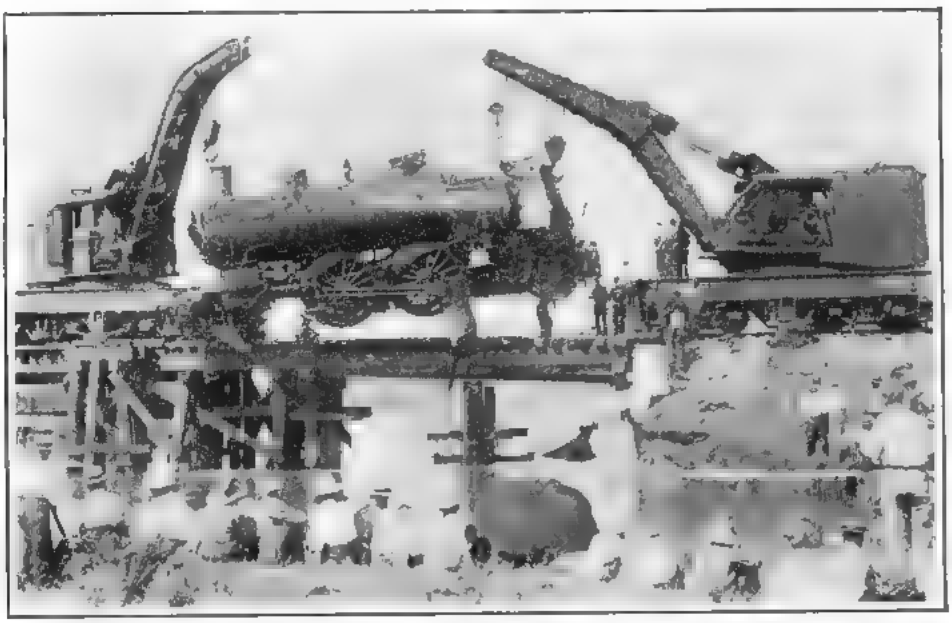
"Help nothing! The road's got plenty of money—let it burn."

"Coals of Fire" on the Farmer.

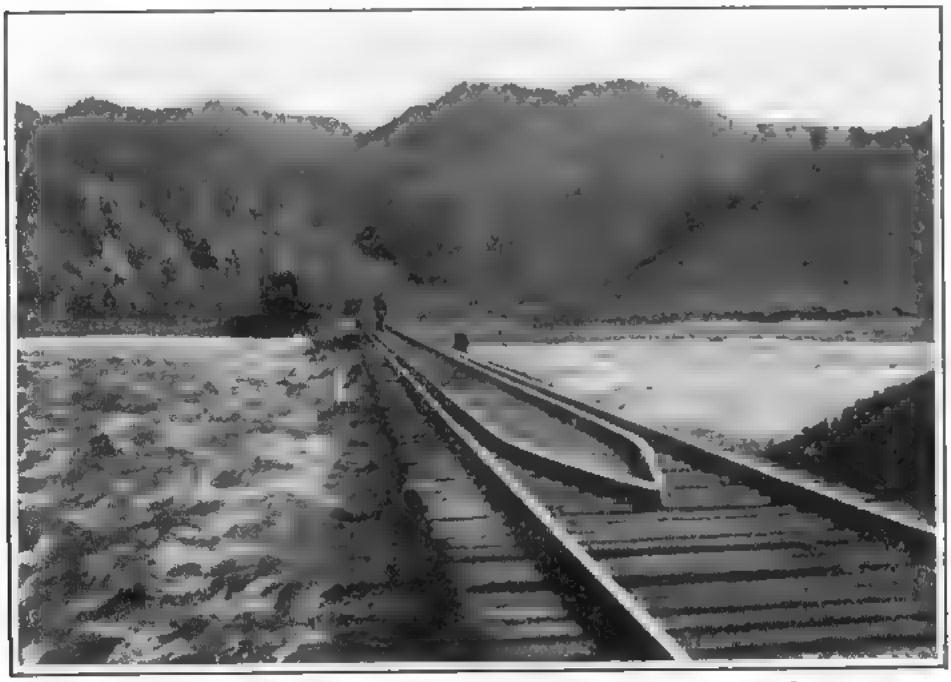
Shortly thereafter this farmer's little daughter appeared, out of breath and in great distress.

"Please," she cried, "the woods are afire and coming toward our house. Won't you send the water-train and save us?"

The "water-train" is a set of flat-cars loaded with water barrels, used by the C. & N. W. for extinguishing small fires. The foreman knew the water-train would do no good, as the farmer's property was a mile and a half from the line, but he promptly started a gang of



WHEN THE BRIDGE OVER MAD RIVER AT WEST LIBERTY, OHIO, WENT DOWN WITH NO 3, IN MARCH, 1913, THE OFFICIALS WERE SO ANXIOUS TO RESTORE RAIL COMMUNICATIONS AT ONCE THAT THEY DROVE THEIR TEMPORARY PILING RIGHT THROUGH THE TRAILER AND ASHPAN OF THE SUBMERGED ENGINE. IT WASN'T TILL THE MIDDLE OF AUGUST THAT THIS SALVAGE SCENE WAS PHOTOGRAPHED THE LOCOMOTIVE WAS REPAIRED AND PUT BACK INTO SERVICE



HIGH WATER ON THE SAN PEDRO AND SALT LAKE ROUTE'S OLD LINE—THIS 784-MILE ROAD, BUILT BY SENATOR CLARKE, OF MONTANA, HAS BEEN SUBJECTED TO THE WORST FLOOD CONDITIONS THAT HAVE EVER CONFRONTED A RAILROAD ANYWHERE

men to the homestead and they saved the farmer's house and barn for him

It is not recorded whether the foreman asked him if he hadn't money enough to let them "let it burn," but it is presumed that the farmer thereafter looked with a different eye at the road's attitude toward fires'

ANOTHER LITTLE SAMPLE OF THE POWER OF WATER THE SALT LAKE ROUTE, WHOSE TRACK WAS THUS DAMAGED AT ECCLES, NEVADA, HAS SPENT MILLIONS IN RECONSTRUCTION AND RELOCATION, AND EVEN SO IT HAS BEEN RAVAGED BY UNCONTROLLABLE INUNDATIONS WHICH HAVE TIED UP TRAFFIC FOR AS MUCH AS FOUR MONTHS

B. and M. Goes the Limit.

The Boston and Maine is particularly stringent in its rules regarding fire prevention, passing as it does through so many heavily-wooded sections. No bonfires are permitted, only safety matches are used, and smoking is prohibited anywhere near inflammable materials.

Ashes are emptied only into metal containers, smoke-arresters are subject to weekly inspection, and frequent inspection is given all ash-pans, to prevent dropping coals

The Illinois Central, which has suffered much from fires on wooden trestles —a dropping coal may never ignite a tie, but a wooden trestle is but a carefully built bonfire waiting for a chance to burn —has installed barrels and buckets on all

trestles, the number varying with the size, so that the man who discovers a trestle fire may have a chance to put it out.

"All fires are small fires when they start" is something all roads are trying to impress on their employees, and the placing and use of hundreds of hand fire-extinguishers in section-houses, tool-houses and especially in oil-houses, is done by so many roads that it would be wearisome to catalogue them.

The Missouri, Pacific and Iron Mountain, like the Pennsy, use locomotives equipped with a fire-fighting device, which costs only about forty dollars per locomotive so equipped.

The Rock Island Lines have set a standard in fire prevention and fire extinguishing which has been widely imitated. According to a recent report, over three hundred men were holding weekly fire-drills with company apparatus, and in one year extinguished two hundred and eighty-three fires, which endangered property valued at over five millions, with a net loss of less than thirty thousand dollars.

Rock Island Lists Over 60 Causes.

The Rock Island lists over sixty causes of fires, of which, in the order of their importance, spontaneous combustion comes first. Therefore, a careful system of inspection of all oils, waste, and refuse has been inaugurated.

Defective flues, engine coals, and sparks come next in order, followed by stoves, hot cinders, and defective lamps. All these determined causes have resulted in special efforts being directed against the recurrence of fires from such beginnings, with the result that the Rock Island has fewer fires, perhaps, per mile of road than almost any other in the country.

With an annual fire loss which can hardly be less than fifteen millions in directly burned property of railroads alone, a forest-fire loss of six millions traceable to fires caused by railroads, and an economic or indirect loss, due to revenue which went elsewhere while rolling-stock, track, bridge, tunnel, warehouse, elevator, or other railroad property was being repaired or replaced, which is simply non-estimable but which must amount to fully as much as the direct loss, the two hundred and fifty thousand miles of line in the United States are paying two hundred dollars each for the privilege of burning themselves up!

Add the insurance premiums paid by railroads, and one has a perfectly stupendous charge against the fire demon.

How to Raise the Smokeboys.

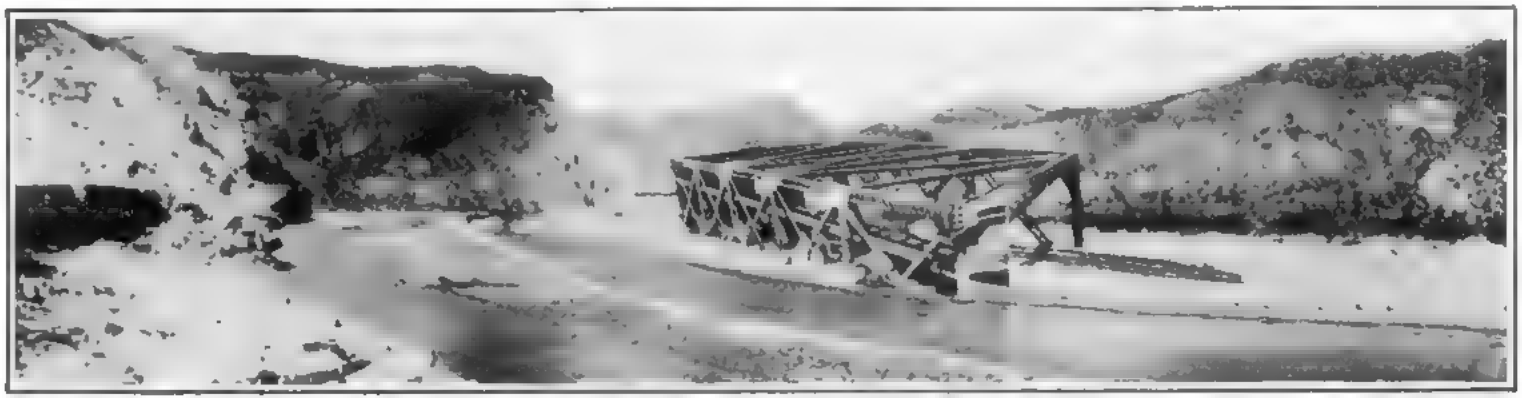
If all the fire losses could be eliminated there would be enough money saved to increase the salary of every engineer in the United States by more than eight hundred dollars a year. Or the firemen and engineers could each have an increase of four hundred a year, or the railroads could add to their dividends or eliminate a few hundred more grade-crossings—but of what use to catalogue what the roads could do with fifty millions they now dissipate in smoke and economic loss due to fire?

Sufficient has been said to show that the roads are awake to their most implacable enemy, and that it is not only to help put out the blaze that the fifty-four, representing over a third of the railroad mileage of the country, have banded together, but to seek out causes and established methods to prevent those causes from working—in other words, to strangle the fire demon before he is born.

Floods More Destructive Than Fires.

But preventable damage caused by fire, which is being fought with an organized campaign, is a mere flea-bite at the railroad's bank-account compared to the havoc wrought by the thing with which fire is fought—water. If fire is a good servant but a bad master, water is a humble servitor in its place, but the most cruel of tyrants when it breaks loose.

COVER A MOUNTAINOUS COUNTRY WITH 15 INCHES OF SNOW ADD A WARM WIND AND A THAW, AND WHAT WILL HAPPEN? THE ENTIRE SNOWFALL WILL MELT IN A FEW HOURS AND BEING UNABLE TO SINK IN THE FROZEN GROUND, IT WILL TEAR DOWN A VALLEY AS ONE HUGE TIDAL WAVE LITERALLY NOTHING MADE BY THE HAND OF MAN CAN STAND IN ITS PATH



AFTER YOU WORK WITH A THOUSAND MEN FOR TWO YEARS, BUILD TUNNELS, RAISE THE GRADE, PROTECT THE BANKS WITH A MILLION DOLLARS WORTH OF RIPRAP STONE TO A DISTANCE OF THREE FEET HIGHER THAN THE HIGHEST HIGH-WATER MARK AFTER YOU'VE SPENT $33,000 A MILE IN MAKING YOUR ROAD "THE SAFEST RAILROAD IN AMERICA" AND AFTER YOU'VE MADE A LITTLE BRAG TO THAT EFFECT IT'S PLUMB DISCOURAGING TO HAVE THE STREAM TREAT A FIFE BRIDGE LIKE THIS, IS IT NOT

The average fire-damage is five hundred dollars. The total fire damage to railroads in property loss may be fifteen millions a year. One good healthy flood will do more damage to a few railroads than all the fires do to all the railroads.

In consequence, flood, flood danger, and flood prevention occupy even more attention in the seats of the mighty than does fire, an attention none the less grave that many flood dangers have been caused entirely by the artificial conditions of civilization. Denuding land of forests, filling-in of swamps, paving of cities, confining streams in artificial channels, restriction of river-banks by buildings and reclaiming land from water, all tend to produce flood conditions.

Probably the worst flood which ever struck this country was that of 1913, when the Dayton horror took place. But let no one think it was the only flood of stupendous proportions.

Our memories are short-lived; each new calamity wipes out the memory of previous ones. And while, perhaps, more railroads suffered in that catastrophe and more monetary damage was done then than at any other single time, many another road has suffered as much in many a previous flood — and probably will again.

Two Roads Lost $6,500,000 at Dayton.

At this time the Pennsy lines west of Pittsburgh suffered to the extent of over three and a half millions of dollars in replacement work. The unseen damage and loss in revenue are simply beyond estimate. Twenty-four bridges were destroyed, fifty were damaged, two hundred and eighteen miles of track had to be rebuilt, and stations, telegraph lines, rolling-stock and lost and damaged freight brought the total to the fortune mentioned.

In the same flood the B. and O. sustained damage estimated at almost three millions—and these are *two* railroad systems out of dozens that were put wholly or partially out of commission by water which treated loaded freight-cars as chips in a brook, which swept tracks from embankments as a bucket of water sweeps away ants, which picked up bridge spans of steel, and whirled them away as wind whirls thistledown.

But the chapter of water damage of the railroads is also a chapter of their glory, for never are the resources of a road so taxed, or the courage and fighting spirit of its organization so emphasized as in these instances of dire calamity.

And to the everlasting credit of every road affected in the great flood of 1913 or the many smaller floods of other years—be it said that the first, last and only aim was to save lives first, and attend to property only when the last refugee was put on dry land.

Reorganization Worse than Rebuilding.

The greatest damage by floods comes, first in the undermining of bridge foundations and washing away of fills at bridge approaches, second in destroying bridge superstructures, third in destroying track—particularly where road-beds parallel streams — fourth in the general damage to telegraph, buildings, and rolling-stock, and last, the loss in freight revenue, in the interruption to service, the disorganization of passenger service and all the failure of income which comes from putting a road or any part of it as completely out of business as if every engine on the metals blew up.

In an ordinary flood, affecting one or two roads, the indirect damage is much less than might be supposed, for trains can be routed over other lines, telegrams sent over other wires, freight delivered, if a little late, in roundabout ways. But when every road in several States is broken, when telegraph lines are so completely disorganized that no one knows where the worst damage is, when for weeks there is no communication between division and division, then traffic stands still, and reorganization is worse than rebuilding.

BRIDGE NO 146, OVER ROCKY FORK, EAST OF LUCAS, OHIO, ON THE PENNSYLVANIA LINES WEST — IN THE OHIO FLOOD OF 1913 THE PENNSYLVANIA HAD NINETEEN TRAINS MAROONED

HOW THEY GOT OVER THE KOKOSING RIVER, MOUNT VERNON, ON THE PENNSYLVANIA'S AKRON DIVISION DURING THE BIG OHIO FLOOD OF 1913 OF COURSE THERE WAS NO CHANCE TO RUN A TRAIN ON THESE UNDERMINED TRACKS

In the 1913 flood, $10,000,000 is a small estimate of the damage caused railroads in Ohio alone, and this year is generally thought of as the year of the great flood. But it is by no means unique.

In the spring of 1903 Kansas City had a little flood of its own, which carried out sixteen bridges, the only one remaining over the Kaw being that of the Missouri Pacific, which took a chance and loaded its structure from end to end with locomotives. This magnificent gamble showed courage of a high order; the reward came when the bridge was the only one left to carry traffic, save lives, and salvage property.

Kansas City's $10,000,000 Freshet.

Ten millions was the estimated damage of this little local flood, of which over a third was sustained and paid by the railroads which center in Kansas City.

Nothing brings out resource better than stress. No movement of army in time of need, no mobilization of freight-cars in great crop movements, can compare to the strain put on a road by the urgency of a flood.

One of the greatest feats of American railroading was the sudden movement of a whole army corps from Kentucky to the front in the East in the war between the States. But the movement of sheet-steel filings from Pittsburgh to New Orleans on short notice to meet an emergency, if less spectacular, was no less a tax on railroad efficiency.

Louisiana suffers from any flood in Ohio, or any flood in Indiana or Illinois. The water has finally to pass out through the Mississippi. Flood forecasts, accurate observations, and a long training have shown how to meet these conditions when they come.

But the 1913 floods came with little warning. However, even when the flood was but a day old in Ohio it was known that the levees in Louisiana were threatened as seldom before.

An emergency order was rushed to Pittsburgh for steel filings. The mills took forty-eight hours to manufacture what was wanted. Then the B. and O. loaded the stuff on a special freight-train and ran it through to New Orleans in four days, in spite of the fact that it had to be routed around flooded districts, and in a time when every nerve was being strained by the road to meet conditions hitherto unheard of in railwaydom.

But the filings arrived in time, the levees were strengthened with them and another disaster averted. That the B. and O. could rush through in record time the longest and heaviest freight ever put together for such a purpose, under such circumstances, has justly been esteemed a feat worth bragging about, even in the offices of rival roads

The worst of a flood is that to-day's high water is no guarantee that to-morrow's may not be worse. This has never been better illustrated than in the case of the Salt Lake Route (Los Angeles and Salt Lake Railroad), which connects Salt Lake with Los Angeles in a direct line through Nevada.

Many readers doubtless have never heard the name, and do not know of the seven hundred and eighty-four miles of line built by Senator William Clark, of Montana. And, of course, those who never heard of the road do not know that it has been subjected to the worst flood conditions which have ever confronted any railroad anywhere. Such, nevertheless, is the case.

Salt Lake Route's Fight.

In spite of recommendations by survey engineers that higher ground be chosen for the right-of-way, the decision was reached to build the San Pedro lines through Meadow Valley in Nevada, on account of shorter length and easier grades. A small and slender stream flows through Meadow Valley, hardly more than a brook and appearing entirely innocent.

Yet in the spring of 1905, shortly after the road was completed, the little brook

THE OHIO FLOOD OF 1913 CRIPPLED THE PENNSYLVANIA'S BRIDGE NO. 143 OVER BLACK FORK WEST OF CUYAHOGA, OHIO, BY DESTROYING THE PIER AND BOTH ABUTMENTS AND WASHING OUT 200 FEET OF APPROACH. THE VIEW SHOWS THE STRUCTURE AS IT WAS BEFORE ANY WORK WAS DONE UPON IT EXCEPT THE BUILDING OF A WALKWAY

got on the rampage and did seven hundred thousand dollars damage. It was repaired, the road being out of commission for two weeks.

In 1907 a bigger flood came to hand —heavy rains and melting snow causing a flood which put the road completely to rout for six weeks, by doing two million dollars damage in a single night, forty-five miles of line being completely washed away.

Well, the powers that be saw the light. If floods were going to keep on coming and increasing in severity, it was time to rebuild and relocate. So experts were called in and the whole system was reorganized.

The channel of the river was changed in many places. Bridges were eliminated, tunnels built, grade raised, sixteen miles of banks were protected with a million dollars' worth of riprap stone, three feet higher than the highest highwater mark. A thousand men worked for two years, and the rebuilding cost as much as many roads cost new — thirty-three thousand dollars a mile. When the job was done it was said that this was the safest railroad in America.

They Crowed Too Soon.

"To-day," boasted the authorities, "the road runs through the cañon forever safe from the ravages of storm. The road-bed is set to last for all time. Nothing short of an earthquake can dislodge those stone walls. Never can the river overflow its new banks."

On January 1, 1910, Nevada was covered with eighteen inches of snow. Came a warm wind, a thaw; the entire snowfall melted in a few hours, and, being unable to sink in the frozen ground, it tore down the valley as one huge tidal wave. Five times as much water went out as had occurred three years before, in some places being twelve feet deep over the tracks which were "secure for all time."

The damage is hardly calculable. It has been termed "the worst railway calamity which ever happened in America," yet thousands never heard of it except for a small notice in Eastern papers.

The first flood stopped traffic for two weeks, the second for six. This flood chopped up the road for almost a hundred miles, and it was four months before the first train got through.

Express Was 137 Days Late.

The fast express which left Los Angeles on December 31, 1909, did not arrive in Salt Lake until May 17, 1910, one hundred and thirty-seven days late!

Oh, yes, they rebuilt. It cost ten millions and took a year, but seventy-six miles of new track were laid, and they were not constructed in Meadow Valley, but high up against the cañon walls; and yet, as the engineer in charge said when the work was done:

"I can't conceive a flood which can touch us. But I couldn't the last time, either."

The human side of a flood is so big it couldn't be told in a book, let alone a magazine article. Stories of bravery are too commonplace to be readable.

The oddities of a flood are without number. Perhaps the most remarkable of all odd incidents connected with the great Ohio flood was the "Panhandle No. 10."

Passengers Issued a Newspaper.

The Pennsy had nineteen marooned trains in flood territory in which were passengers. It was the road's first care to look after these.

Their trains were pulled to high ground, and passengers housed on the trains, fed from dining-cars or taken to such hotels or private houses as could care for them. Passengers who elected to stay on their trains in the hope that eventually they would get somewhere amused themselves in many ways.

At Bradford a train was held up containing some newspaper men and business men who had once written for a livelihood. A semi-flooded printing-office

attracted them, and "Panhandle No. 10," a single-sheet newspaper, was the result. It was humorous in contents and brave with optimism, although very outspoken

Little drops of water, falling through the air,
Put the Pennsy Railroad on the bum for fair

was one gem, and a list of fifty-three passengers owning stock in the road was another, sworn to before a notary on the train, who added, "My commission expires as soon as these dog-gone waters go down, as I am moving to the mountains."

It would be idle to select from all the Herculean work done in flood times any one piece of reconstruction and say, "This is the most remarkable." All reconstruction done in a hurry under such conditions is remarkable. But certainly not the least wonderful was the "eight-day bridge" at Zanesville, built by Paul Didier, of the B. and O.

Built a Bridge in 8 Days.

"If you can imagine a roaring Bengal tiger, unchained, extremely hungry and with a toothache," said an admirer of the imperturbable engineer, "and then imagine a dentist trying to fill that aching tooth without getting hurt, and doing a job which would allow the tiger to eat, you can have some idea of what Didier had to do."

The river at Zanesville had taken all there was of the bridge except a couple of stone abutments. There was no pile-driver to be had, and if there was, it couldn't be used.

They couldn't even sound the water to find out how deep it was; a three-hundred-pound steel rail on the end of a rope was swept away like a straw. So they built the bridge by rule of thumb. Bents were made — two-legged members of a temporary bridge, something like an inverted letter U—and put down one by one. When they were too long they were hauled up and cut off. When they were too short they were hauled up and new ones made

"It wasn't bridge-building, it was bridge-guessing," said Mr. Didier. "But we had to guess. And we had to build. The trains *had* to go across."

So they went across. In eight days the temporary structure was completed, a little engine run over, a string of empties, a loaded freight, a passenger.

"Four miles an hour limit of speed, but bridge is open," wired the engineer —and for weeks the temporary bridge built by guesswork was the only means of communication between Zanesville and the outside world, and all because an engineer wasn't afraid to forget all he ever knew about scientific bridge-building and become a mere carpenter.

How Washouts Are Handled.

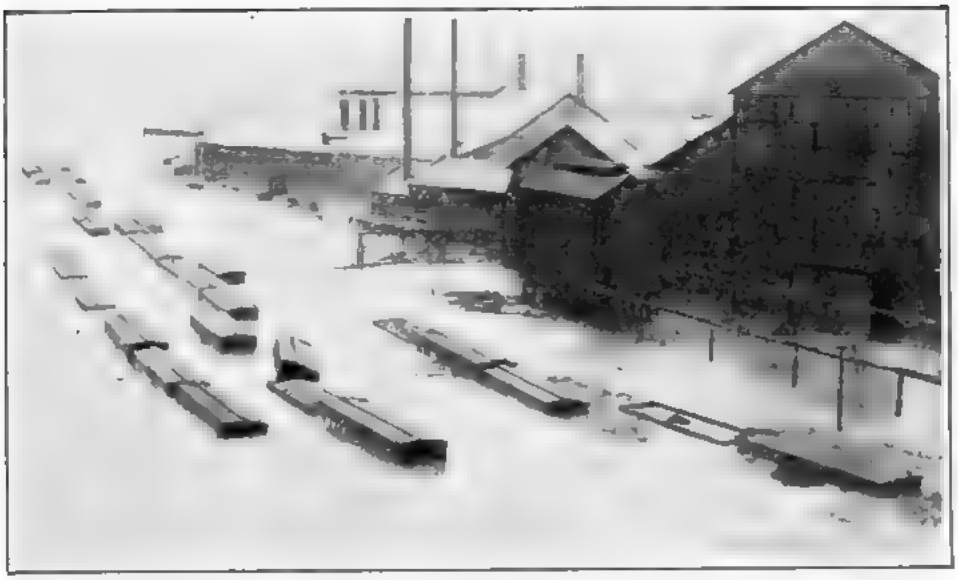
Floods range all the way from a washout of a small culvert, due to some local cause, to a flood like that of 1913 in Ohio, or the great floods in the East in 1912, or the Galveston storm, or the San Pedro destruction.

The railroads are constantly at work trying to prevent all classes. The washout is guarded against with inspection, with riprap, with drainage canals for swamps, with ample culverts, with every possible precaution against a recurrence.

Unfortunately it is by no means always possible to foretell where one is going to come. When a road is located on an unprotected bank parallel to a stream near a mountain the road knows a danger spot exists. But often a washout will come where no danger has been thought of; such can only be prevented a second time.

For the great floods no railroad can do more than urge with all its power upon the legislature of the nation adequate flood investigation and protection. Confining the Mississippi, the Missouri and the Ohio to their places is not a job for any railroad, any State; it is a job for the country as a whole.

And the country has recognized its responsibilities in the matter; for no later than last March 4 the President signed



NO, YOU WOULDN'T GUESS IT, BUT THIS IS A SWITCH-YARD. TO BE EXACT, IT IS THE PENNSYLVANIA'S MARKET STREET YARD AT YOUNGSTOWN, OHIO, TAKEN AT THE TIME WHEN OLD JUPE PLUVIUS WAS PAYING A SOCIAL CALL

the Flood-Control Bill, which provides, at a cost of many millions, for the reclamation of lands along the Mississippi and Sacramento Rivers. Thus within another

PENNSY'S COALING-TRESTLE AT MAHONINGTOWN, PENNSYLVANIA, SHOWING HOW THE GOING-OUT TRACKS AT THE ENGINE-HOUSE WERE ENTIRELY SUBMERGED—NO RAILROAD IN THE EAST FEELS ENTIRELY SECURE AGAINST A REPETITION OF THESE CONDITIONS

decade these streams, as one authority prophesies, "will cease to vex the country with ever recurrent disaster."

But in the mean time, while governmental machinery is getting in motion, the railroads continue to do what they can.

In the flooded district bridges are rebuilt, bigger, stronger, and higher. Tracks are raised, riprap protection is put down with a lavish hand, and every danger spot is guarded. Unlike the fire danger the flood danger comes from unpreventable causes. No man may say, "You shall not thaw," or, "You shall thaw slowly."

Man has said to his natural protection, trees, "You must come down to build me houses and cars and telegraph-poles and sleepers and bridges and beds and furniture," and has also said to the rain, "I do not want you in my cities, but I want mud less; therefore, I will provide you with paved streets and many pipes so you can get quickly into the rivers."

For these reasons he can hardly complain if the river gets quickly out of hand.

However, the end is not yet. Although levees, forecasts, observations, better bridges, higher tracks, and ripraps are minimizing the chances of another such flood as that of 1913, there isn't a railroad in the East which feels entirely secure. And of the two sources of enormous loss—fire, with its toll of probably fifty millions a year all told, or flood, which may be a million one year and half a billion in total loss the next, the railroad much prefers to take its chance with fire, which at its worst can be no larger than a city, and which seldom gets beyond the control of a reasonable force.

But, whether they fight fire or water, the railroad army is always ready to fight something. That their powers and ability of prevention will some day equal their power of fighting and subjection, is the earnest prayer of every commanding officer in the railroad army who has stood on the water-line in fighting fire, or the firing-line in fighting water.

When that day comes there will be no necessity for the great working surplus of capital, freight-rates can go down and wages and dividends both increase

UNCONQUERED.

BY HAROLD CRAWFORD STEARNS.

(ELECTRICITY SPEAKS:)

I MOVE your mills and your trains,
I talk to your friends and foes—
Up hill, down dale, in calm and gale,
Wherever your pleasure goes!

I steer your ships in the night,
I manage your belching guns,
I flash your words, I forge your swords
As fast as your craving runs!

But when you call me a slave,
Remember my daily toll!
My brawn you chain, but not my brain,
Nor the secret of my soul!

DELIGHTS OF DESPATCHING.

BY LEROY PALMER.

Thanks to the Lowly Opr, Who Gets No Credit at All, Both Despr and Condr of 3d 248 Have the Last Word.

HANDLING the present double-track volume of business on a single pair of rails is making life in the operating-department of some of our Western roads more than ever a strenuous one, demanding the full energy of youth and the last resource of the grizzled veteran. The following illustrates the position of the "OS" operator in the game, and the opportunity presented to him to display his powers as a diplomat to "pour oil on the troubled waters."

SCENE—D. & P. Telegraph Office at Lone Wolf Station.

TIME—The Present

HOUR—1:45 A.M.

TRAIN-DESPATCHER *(At division headquarters, Smoky Forks, to operator, Lone Wolf)*—Tell that man on 3d No. 248 I want to know why he couldn't make Stanley with his first cut for No. 93.

OPERATOR *(to conductor of 3d No. 248)*—Despatcher says he thought you'd make Stanley with your head-end for No. 93.

CONDUCTER OF 3D NO. 248 *(to opr)*—Well, if he thinks we can get anywhere with this train, he's got another think coming! If we'd had any more cars tied to us we'd have had to make three cuts of it. We ought to have had a helper out of Pyramid, and he knows it!

OPR *(to despr)*—He says his train was too heavy; didn't have time to make it.

DESPR If he had used a little sense and called up on phone soon as he got to Red Point I might have helped him out of there.

OPR *(to condr)*—Says if you'd called up from Red Point he could have helped you.

CONDR *(loudly)*—You tell that pinhead that I was too busy chaining up cars and getting into clear for 1st No. 17 to do any phoning. Ask him why in thunder he didn't give us that time on No. 14 at Eagle Rock if he was so anxious to help us!

OPR *(to despr)*—He broke in two and had to chain up and get clear for 1st No. 17. Says he should have had that run late on No. 14 at Eagle Rock.

DESPR What that crew needs is a little pep. They don't try to get anywhere. Tell him the work they are doing to-night is a disgrace. The time on No. 14 wouldn't have done them any good because they stayed at Eagle Rock for the stock extra when they had plenty of time to make Quartz. I couldn't let him go to Mesquite because the No. 2747 was hung up there, and I can't saw *all* the passenger-trains on the road for that guy. He didn't do a thing but stab No. 112 for a 25-minute delay at Dry Run. I never saw such bone-head work!

OPR *(to condr)* Says the time on No. 14 wouldn't have done you any good because you stayed at Eagle Rock for the stock extra. He had the No. 2747 in at Mesquite and didn't want you to saw No. 14 like you did No. 112.

CONDR *(louder, eyes glaring)*—Ask that poor boob how he figured we could get out for the stock extra when we had to have water after that banana-train went

by? How far does he think an engine out of water will pull a train? Ask him that!

OPR *(to despr)*—He says they had to have water after the banana-train passed and couldn't go to Quartz.

DESPR—Tell him if he or that engineer took the least interest in their work they would have had water before that banana special got there, and it's a dirty shame they didn't. And tell him I'm no mind-reader. When they are going to camp at one place half the night I'd like to know it so I can let somebody roll 'em that can roll 'em. I stuck that west manifest No. 2747 at Mesquite 30 minutes on his account.

OPR *(to condr)*—He figured you'd get water before they got there. Says if he had known you were going to be at Eagle Rock so long he'd have moved that No. 2747 from Mesquite.

CONDR *(yelling)*—Ask that poor simp how we could get water with that soldier-train blocking us! Tell him to use his head a little! Who is that fat-head working this trick, anyhow?

OPR *(to despr)*—Soldier-train blocked them from water-tank. *(To condr)*—It's Leonard. He's as good as any of them, but they're all alike.

DESPR- For the love of Mike! They were at Eagle Rock 20 minutes before that troop-train got there. Now tell him to wake up and get that train of his into clear for 2d No. 17 and not to wait till they get there to do it, either. That crew is the limit! If they hold up 2d No. 17 they can explain it to K. B. F.

OPR *(to condr)*—You'll have to get in the hole here for 2d No. 17, he says, and he doesn't want them stopped.

CONDR *(still yelling)*—Tell him I'm running this train, to give us our documents and we'll do the rest and we don't need him to tell us how. *(Rushes out to instruct crew).*

OPR *(to despr)*—Wants his orders so can leave on arrival 2d No. 17.

DESPR—O.K. Clear him with that wait on No. 33 and tell 'em if they don't make Cactus on it they'll be stuck at Parker for the whole parade and won't get out for a week.

OPR *(to condr, who comes in puffing and blowing)*—He says if you don't make Cactus you'll get a bad stab at Parker.

CONDR *(disgustedly, and out of breath)*—Well, we can't make Cactus on this. I don't s'pose that mutt knows what tonnage we've got. It does those guys a lot of good to put our tonnage down on the sheet; they never look at it afterward. But I s'pose a fellow isn't to blame for being weak-minded. Well, I should worry; but if he don't give us a show to get over the road the dog law will get us. Tell him our 16 hours are up at 8:15. Honest, kid, I never saw such rotten despatching! It's awful! You tell him Bill Ragan said so.

OPR *(5 minutes later, to despr)*—OS, OS, WF, 2d 17 by 155, 3d 248 de 2 A.M. *(To himself, as he grins and lights up his old brier)*—This is the life! Guess I'll try for a job as war censor or chief mediator to settle the Big Scrap!

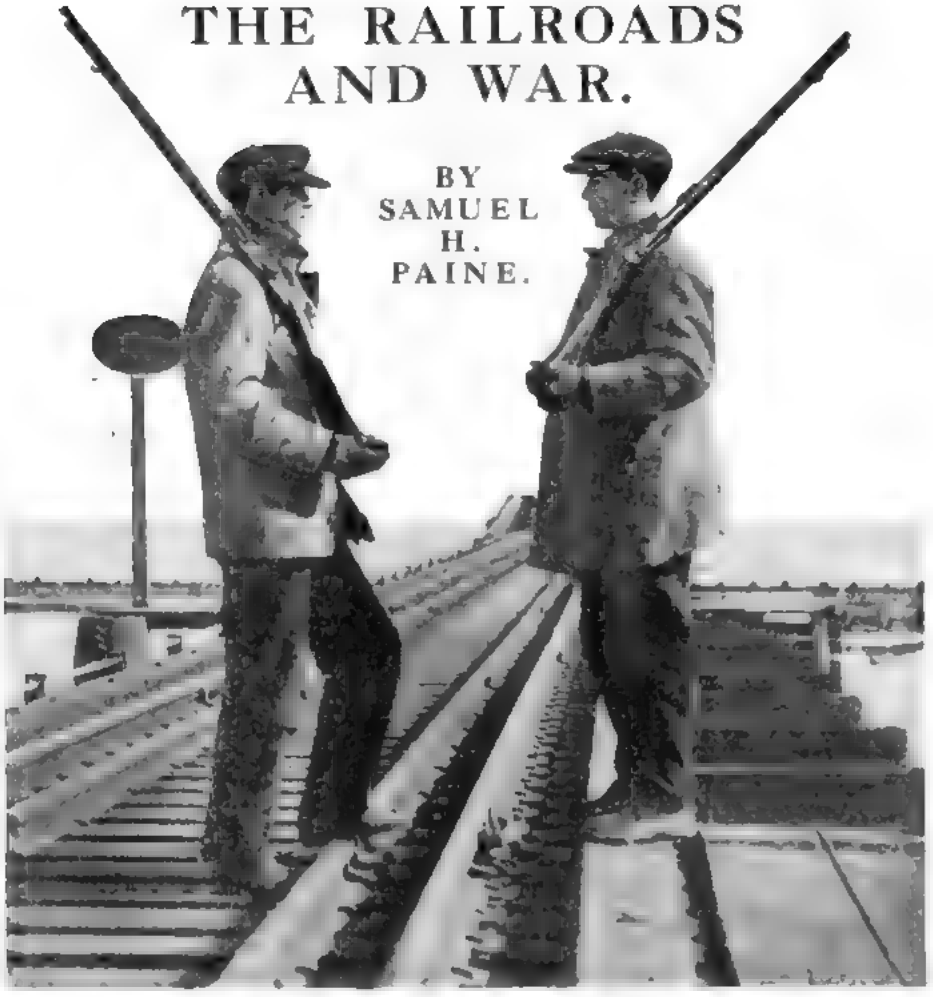
"INFORMATION" SAYS:

IF there was a Federal tax of a cent a yard on useless conversation, the national debt could be paid in ten minutes.

from The Railroad Man's Magazine

THE RAILROADS AND WAR.

BY SAMUEL H. PAINE.



GUARDS SET BY THE PENNSYLVANIA AT ITS RAILROAD BRIDGE ACROSS TOMS RIVER, NEW JERSEY —BRIDGES AND OTHER RAILROAD STRUCTURES HAVE BEEN UNDER CONSTANT WATCH AND WARD EVER SINCE THE UNITED STATES BROKE OFF DIPLOMATIC RELATIONS WITH GERMANY

WHEN black war-clouds cast a shadow over the peace-loving realm of the United States instant consideration of the railroads as a means of defense came from the government, and railroad officials alertly took the initiative in placing at the disposal of the nation every mile of track and every wheel

With the peace of the country actually menaced the people presently learned that, however much other means of defense had been neglected, the transportation system was in a state of high preparedness

No sooner had the news of the diplomatic break with Germany been flashed than the railroads immediately set about defensive measures. On their own initiative many of the larger roads established a night and day guard over freight and express depots, roundhouses, power-plants, bridges, yards, and passenger-terminals.

Thus, the Chicago, Rock Island and

Pacific set guards on its bridge over the Mississippi at Memphis, Tennessee, and also on the Rock Island bridge, the United States government cooperating in the work at the latter point. Again, the Chicago and Eastern Illinois placed sentries on its bridge spanning the Kaskaskia River, near Shelbyville, Illinois, while the railroad approach to the port of New York over the Toms River, New Jersey, was also watched by armed men, as is shown by the engraving on page 22.

Connecticut and Rhode Island were among the earliest States to call out the National Guard to protect railroad bridges generally in their territory. New York lost no time in sending troops to the bridge which crosses the Hudson at Poughkeepsie, while militia of Massachusetts watched over the Hoosac Tunnel and the bridges across the Connecticut River that lay within the jurisdiction of that State.

These are only a few examples of the kind of protective measures adopted within the first few hours after the fateful news of a diplomatic break was made public. From the instant of the first warning the railroads set about taking precautions; and these precautions became more widespread and more stringent from day to day.

Railway Is Chief Ally of Mars.

The policy of guarding the transportation facilities with the utmost diligence met with the entire approval of the military authorities; for in view of the experiences of the belligerent nations of Europe during the past three years no army man questions the statement that the railroad is the chief sinew in modern warfare. It has been rated high since the wars of Napoleon. Efficient rail communication means mobility and in mobility there is strength that outweighs numbers of an enemy.

The history of the brilliant successes of the contestants of the stupendous World War is, indeed, a chronicle of clever manipulation of troops, rather than of gigantic drives and mighty pressure in routine battling.

General Gallieni saved Paris at the outbreak of the war by his amazing sortie from the French capital with an army of 70,000 men, transported about 35 miles in six hours, in taxicabs and small automobiles, commandered for the occasion.

That sudden maneuver is remembered as one of the most strikingly effective feats of the war. It was a conspicuous definition in the concrete of the value of mobility.

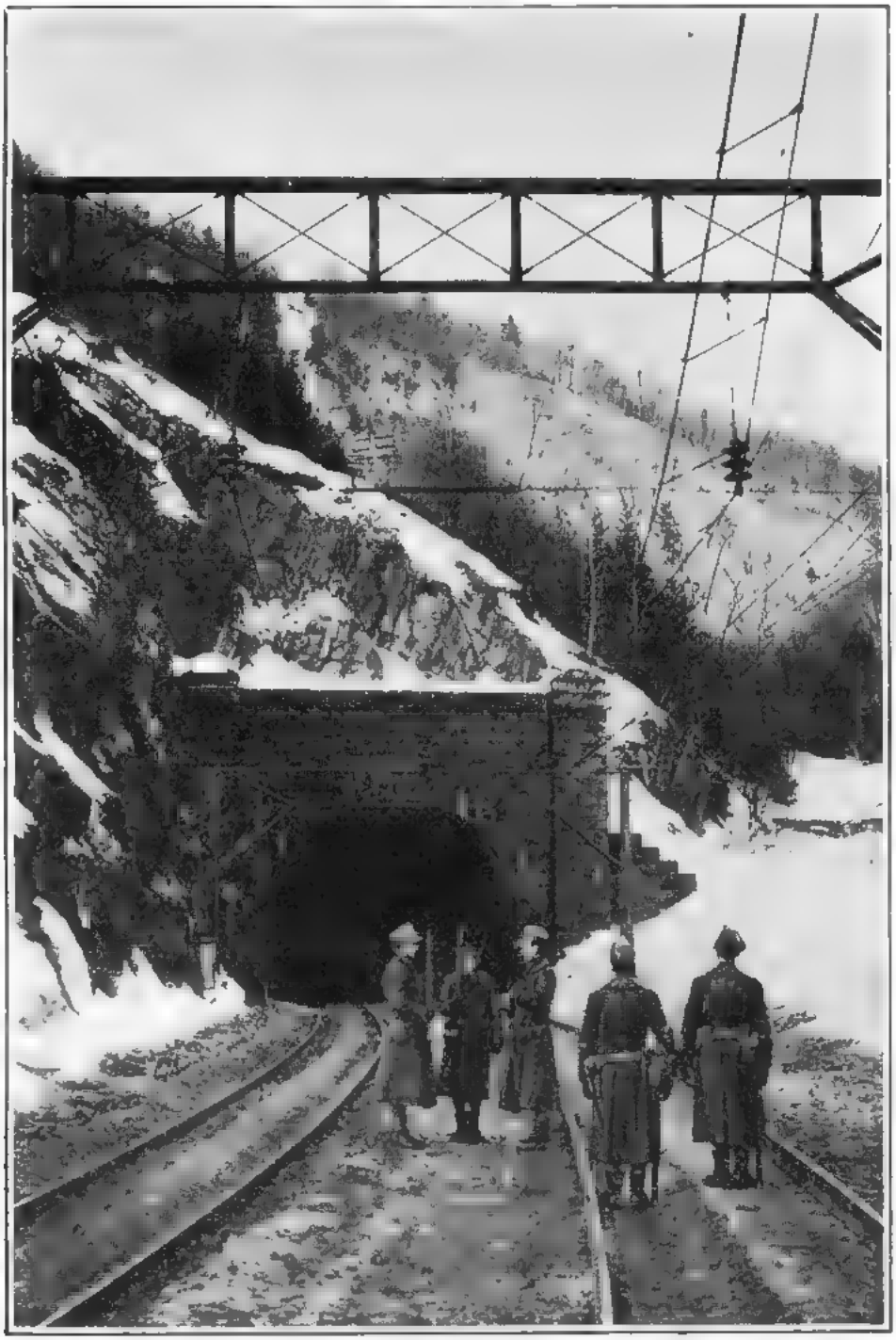
Roads Pledged Help to War College.

The War College at Washington had not long to wait for definite action by American railroads when diplomatic relations were broken with Germany and the war threat had suddenly been substituted for the negotiations looking to that peace among nations for which the universe eagerly craved. "We are at your service, prepared and awaiting your command," was the message, in effect, that flashed across the wires to Washington.

For months the Committee on Transportation and Communication of the Advisory Commission of the Council for National Defense, headed by President Daniel Willard, of the Baltimore and Ohio Railroad, had been in close communication with officials of the War Department. When the danger became an actual menace, the work of promptly organizing the railroads for defense fell upon the Executive Committee of the American Railway Association.

Four committees were named to undertake the work of operating the railroads for military purposes. There was a committee for each one of the four military departments of the country.

Headquarters were established at the seats of the regular military departments at New York, Chicago, Fort Sam Houston, Texas, and San Francisco. The chairman of each committee of railroad men was selected partly because of the near location of his office to the military head-



MASSACHUSETTS GUARDSMEN HAVE BEEN DETAILED TO WATCH THE HOOSAC TUNNEL DAY AND NIGHT DURING THESE TROUBLOUS TIMES. THIS IMPORTANT TUNNEL THROUGH THE HILL BARRIER OF WESTERN MASSACHUSETTS, IS THE LONGEST UNDERGROUND PASSAGE FOR STEAM ROADS IN THE UNITED STATES, COVERING NEARLY FIVE MILES

STATE TROOPS GUARD THE RAILWAY BRIDGE WHICH SPANS THE DEERFIELD RIVER, AT NORTH ADAMS, MASSACHUSETTS, TO PREVENT CRANKS FROM DAMAGING THE HOOSAC TUNNEL TO WHICH IT LEADS AND THROUGH WHICH MOST OF THE FREIGHT FROM THE WEST MUST PASS

RAILROAD MEN ON WAR FOOTING.

The following is the personnel of the four committees appointed to act with the military commanders on behalf of the steam railroads of the country:

Fairfax Harrison, president, Southern Railway, general chairman.

Eastern department: L. F. Loree, president, Delaware and Hudson Company, chairman; W. G. Besler, president, Central Railroad of New Jersey; Daniel Willard, president, Baltimore and Ohio Railroad; A. W Thompson, vice-president, Baltimore and Ohio Railroad; A. H. Smith, president, New York Central Railroad, J. H. Hustis, receiver, Boston and Maine Railroad, W. J. Harahan, president, Seaboard Air Line Railway.

Central department: R. H. Aishton, president, Chicago and North Western Railway, chairman; G. L. Peck, vice-president, Pennsylvania lines west of Pittsburgh; E. E. Calvin, president, Union Pacific Railroad; C. H. Markham, president, Illinois Central Railroad, G. T. Slade, vice-president, Northern Pacific Railway.

Southern department: W. R Scott, president, Southern Pacific lines in Texas and Louisiana, chairman; B. F. Bush, receiver, Missouri Pacific Railway; C. E. Schaff, receiver, Missouri, Kansas and Texas Railway.

Western department: William Sproule, president, Southern Pacific Company, chairman; E. P. Ripley, president, Atchison, Topeka and Santa Fe Railroad; J. D. Farrell, president, Oregon-Washington Railroad and Navigation Company.

The American Electric Railways Association has also appointed a committee of cooperation Its chairman is General George H. Harries, president of the Omaha Gas and Electric Company; its vice-chairmen are Frank R. Ford, of Ford, Bacon and Davis, New York City; L. S. Storrs, president Connecticut Company, New Haven, Connecticut; B. I. Budd, president Metropolitan West Side Elevated Railway Company, Chicago; C. L. Allen, Allen and Peck, Inc., Syracuse, New York, and W. R Alberger, vice-president and general manager, San Francisco-Oakland Terminal Railways, Oakland, California.

ONE RAILROAD COMMITTEE WAS APPOINTED FOR EACH OF THE COUNTRY'S FOUR MILITARY DEPARTMENTS—THESE MEN ACT FOR 280,000 MILES OF LINES IN THE UNITED STATES, CANADA, AND MEXICO

quarters, that he might be in instant communication with the military commanders.

Represent Whole Industry.

Fairfax Harrison, president of the Southern Railway, largely because of his experience in transporting troops to the Mexican border, was selected as the general chairman of the Special Committee on National Defense of the American Railway Association, which is acting for 280,000 miles of lines.

The statement that the railroads of the United States were in a state of high preparedness is to be taken in a general sense. In the whole world there is no such broad and highly developed system of railroads as that possessed by Uncle Sam. It was created, however, for the pursuits of peace; it made no claims to efficiency on special military lines, comparable with the transportation system of Germany, for instance.

In fact, ever since the Franco-Prussian War, Germany has made a prime consideration of the service of her rail lines in cooperation with her army and navy.

In 1870-71 Germany used her seven railway lines in the north and three in the south, only one having a double track, to

transport 16 army corps, numbering 450,000 men, to the frontier and accomplished the strategic feat in eleven days.

To-day Germany has twelve double-track lines grilling her broad surface and the manner in which she has made use of them to prosecute the World War has been a striking example of the railroad as a weapon for offensive as well as defensive operation.

W. W. ATTERBURY, PRESIDENT, AMERICAN RAILWAY ASSOCIATION

IMMEDIATELY UPON THE SEVERANCE OF RELATIONS WITH GERMANY, THE RAILROAD LEAGUE UNDER MR. ATTERBURY'S LEADERSHIP APPOINTED FOUR COMMITTEES TO ACT WITH THE MILITARY. MR. ATTERBURY IS VICE-PRESIDENT IN CHARGE OF OPERATION OF THE PENNSYLVANIA RAILROAD

Every army corps normally garrisoned east of Osnabruck on the north and Ulm on the south has had a double-track railway at its disposal.

When the reserve army corps were mobilized they had the same facilities available for use.

Germany's forces were provided with eighteen double-line bridges across the Rhine, so that it was possible to despatch 96 trains westward in 12 hours. Thus in about 20 hours she was able to move her whole offensive force to the frontier, between the evening of August 3, 1914, and noon of the following day, assaulting Liège on August 5.

Six double-track railways were available for the movement of troops from the west to the east. For the transportation of 40,000 men, some 900 miles, a week was allowed. The movement of this force occupied 124 days and only two or three days were allowed for preparation.

Double-Tracking Gives Big Advantage.

Double-track systems have been of tremendous advantage throughout the war. The system, in general, has been to utilize one track for the movement of troops and supplies to the front and the other for hospital trains, returning the wounded.

The railroads of England and France have been efficient, but they were not nearly in such a state of preparedness as the German lines. In France the army took over the entire railway system, including the personnel. The British government leased the railroad lines of the United Kingdom.

In the United States, owing to the greater distances and the smaller double-track mileage no such mobility as Germany displayed could be effected.

As 90 per cent of the arms and ammunition works of the nation are within 200 miles of New York and well served by double-track railroad facilities, the railroad and military authorities believed that there could be effective handling of supplies for operations of defense on the Atlantic seaboard. On the Mexican border and the Pacific Coast, however, the problem was severe.

Despite the fact that the threat of war fell upon the country at a time when the railroads were under terrific stress of domestic traffic, with an enormous car shortage, it was held that the equipment would be sufficient adequately to supply the wants of the people, under military restriction, and at the same time meet the demands of the military.

Attention was directed to the fact that the railroads were not equipped with special rolling-stock to accommodate big guns. There were no cars fit to carry the new sixteen-inch cannon that the Ordnance Department had developed, except one car owned by the Bethlehem Steel Company. To transport a fourteen-inch gun a car with a capacity of 200,000 pounds was required, and there were few of such cars available.

Lieutenant-Colonel James E. Hoffer, of the Ordnance Department, informed railroad men that the government would need transportation for guns of the following dimensions and weights:—

Caliber, inch	Weight pounds	Length	Width, inches
12	132,000	42 ft.	66.2
14	130,000	48 ft. 3 in.	66.7
16	284,000	40 ft. 3 in.	90.5
16	367,000	67 ft. 2 in.	88

There was but a limited supply of cars to accommodate any of these guns, and none at all for the sixteen-inch weapons.

Heavy Freight Demands.

It was anticipated that with actual hostilities the freight of the railroads would include not only the carriage of the vast numbers of men, guns, ammunition, horses, and commissary supplies, but a mighty array of modern fighting-material, such as all descriptions of motor-power, with steam shovels for trench-digging, caterpillar tractors from the prairies for hauling the siege-guns, powerful trucks taken from industry and equipped with dynamos for charging wire entanglements, aero-

planes, bridge material, and an amazing lot of other heavy paraphernalia.

W. L. Park, vice-president of the Illinois Central Railroad, in an address on the subject of the railroads in a system of national defense, declared that every employee of the railroads should be placed under military control, the welfare of the nation being given precedence over all other considerations.

If the railroads of the nation were to be put under military control it meant that more than a million men, disciplined as no other class of workers in the country are and both able-bodied and intelligent, would fall under the command of the authorities for transportation effort with military considerations foremost.

The equipment available for use would include nearly 70,000 locomotives, and nearly 3,000,000 cars of all classes.

Our entire main-line trackage, as of 1912, was 279,219 miles, whereas Germany, at the same time, had 53,148 miles. Germany's population is almost three times as dense on its lines of railroad as that of the United States.

In considering our railroads as a military asset it was necessary to remember the vast distances, with 3,000 miles between great cities and a population of 102,000,000 scattered over 2,974,000 square miles of territory.

Nation's Fate in Balance.

George Dallas Dixon, vice-president in charge of traffic of the Pennsylvania Railroad, for years an ardent advocate of railroad preparedness for war, said:

"The very existence of the nation, in the unhappy event of war, might well hinge upon the ability of our interior transportation systems to bear the tremendous burden that would be put upon them without collapsing.

"The war in Europe has taught no surer lesson than this, that great forces of men, however, courageous or admirably trained, are of little military value without the means of moving them with promptness and order and of keeping their many needs continuously supplied. This means transportation facilities that can be counted on to work with the smoothness and certainty of a machine. Without such facilities, all other preparations are useless and the effort put into them is wasted."

During the summer and fall of 1916 a committee of railroad men worked with military experts perfecting plans for the practical use of the transportation system in the event of hostilities, but the objective then was possible war on the Mexican border. A considerable amount of data was prepared, however, which was adaptable for use in the contingency of a war with a European power.

A Serious Neglect.

In a general way the War Department knew what the railroads had to offer and where the weaknesses lay, and railroad men were given information as to what the demands of the government would be.

It was believed that an effective plan was formulated, though the whole proceeding was in queer contrast with the policy of Germany, whose railroad and military authorities have for half a century worked cooperatively. It is said that there was scarcely a sidetrack laid in the German Empire, which did not first have the scrutiny of the military authorities with a view to making it in some way apply to the scheme of advantage in case of hostilities

It was railroad men in this country who pressed the government for adequate knowledge of military plans that the transportation system might be responsive in time of need.

It was pointed out to the government that there should be a permanent board whose business it would be constantly to keep, for military purposes, an accurate account of railroad facilities, as well as to examine tracks, terminals and rolling-stock and see to it that lack of railroad communication would not anywhere open the gates to an invading force.

The commission would be expected to

recommend improvements, the government to bear such of the expense as might be directly chargeable to military advantage, without value to ordinary commercial pursuits.

It was lack of just such a system as this that caused delay and congestion in the Spanish-American war. Although there was bitter public condemnation of the failure at the time the warning did not serve to correct the neglect and the government awaited another crisis before taking advantage of the opportunity to estimate the country's transportation system as a military asset.

How closely allied will be the work of the steam and electric roads in case of war, and how much they will have to depend on each other, is evidenced by the following statement made by General George H. Harries, president of the Omaha Gas and Electric Company, and selected by the American Electric Railways Association as chairman of the Committee on Cooperation with the War Department:

Electric Roads to Cooperate

Responding to your telegram, I would say that the most important field of usefulness of electric railways in the matter of aiding in national defense is in connection with transportation of men and material from and to standard steam lines to our coast artillery posts.

The problem of effective partnership between the steam and electric roads will be by no means capable of easy solution. The desire of the association's committee is to find out how many electric roads are in shape to handle without breaking bulk the heavy material which may be conveyed to junction points by steam and how many others there are which could be rapidly made fit for such service. Motive-power, track-curvature, clearances, and bridges, have to be primarily considered

In the many cases where electric roads will be unable to handle steam rolling-stock, we must be informed as to the usable equipment which can be depended upon, so that there will be no guesswork as to the number of troops or the tonnage of supplies that could be successfully handled in the shortest practicable period of time.

Very few of our coast defense posts are without electric railway connection with near-by towns. Very few of these posts have anything like direct steam connection What we therefore desire to know is the physical relationship of steam and electric carriers, the ability or inability of the several electric roads to maintain effective transportation, communication with steam roads, and then we must have the facts as to the manner in which men and supplies can be handled either regularly or in time of emergency

Baker Praises Railroads.

At the Railways and National Defense Council held in Washington recently, Newton D. Baker, Secretary of War, expressed his appreciation of the splendid manner in which the railroads are cooperating with the government in preparing for emergencies.

Mr. Baker also said in part:

We are in a time when war has so far changed in its character that it means, on a vastly greater scale than ever before, the instant mobilization of all the industrial resources of the nation Transportation is next in importance to the number and size of guns.

I cannot suggest particular problems. In some parts of the country perhaps very much enlarged terminal facilities ought to be carried out, larger than the present commercial and industrial needs, with an eye to their future use in an emergency of this kind. It is possible that a large stock of reserve material should be accumulated with a view to its being available for instant use in time of emergency.

The history of war during half a century proves that inefficient railroads or railroads unprepared for war mean starvation and failure to defensive forces and a terrible penalty in life and property to non-combatant citizens. An army equipped in the most modern fashion and numbering a million men is of no service if mislocated or unable to move swiftly to the point of attack

As the European war has so clearly demonstrated, even small forces equipped with fleet and adequate system of transportation, may defeat the plans of armies superior both in number and arms.

FAMOUS "999" LIVES AGAIN!

World-Renowned Engine, Entirely Rebuilt, Is Now Pulling Passenger on N. Y. C.'s Pennsylvania Division.

BY JOHN C. CULVERT.

DO you believe in the reincarnation of souls—in locomotives? No?

Well, old 999 is now pulling a passenger-train between Avis and Clearfield, on the Pennsylvania Division of the New York Central. Yes, certainly, she was dead—years ago. But this old idol of the railroad world is running again, as full of pep as ever.

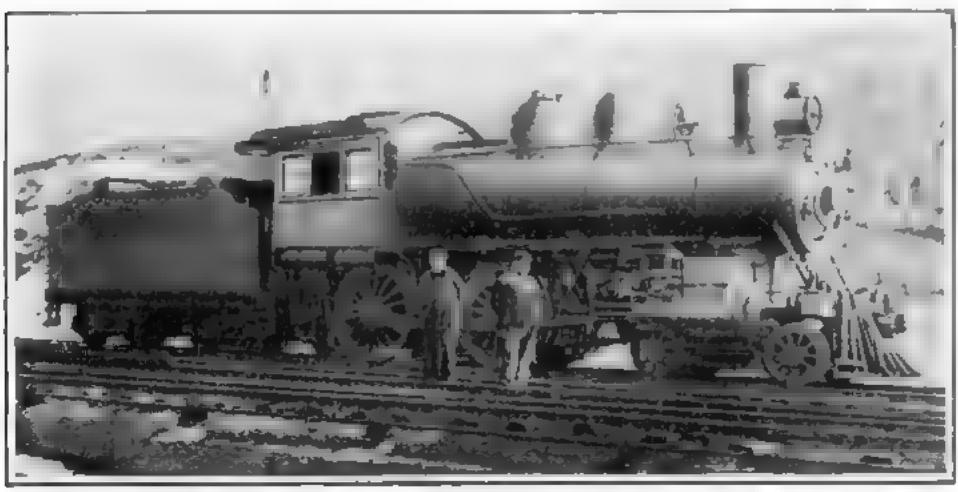
Resurrected, born again, and as spry as a thoroughbred colt turned into the paddock on a frosty morning is 999.

Some unimaginative paint-slinger has changed the number, though. He has marked on the sturdy sides of the famous engine the numerals 1086.

Apparently, in the second life, railroad locomotives have to win their laurels all over again. But the insiders, the elect of the rail, can't be fooled. Underneath those deceptive numbers is the skeleton of old 999, one of the greatest racing-machines that ever pounded rails in any part of the world.

This locomotive is now 24 years old in point of service, and though once down and out, supposedly in its grave, has been equipped with modern devices, and is making fast time, thank you.

After a vigorous career, 999, which had been shown at the Chicago Exposition as a marvel of speed, reported to have traveled at the rate of 112½ miles an hour, was sent to the Cape Vincent branch of the New York Central a few years ago, and was put on the job of hauling a milk



HERE'S OLD WORLD-BEATING "999" AS SHE LOOKS IN HER RESURRECTION RAIMENT

Date.	Railroad.	Terminals.	Distance Miles.	Time M S.	Miles per Hour
May, 1893	N. Y. Central and Hudson R.	Crittenden to —	1	0 32	112 5
Aug., 1895	Pennsylvania	Landover to Anacosta	5.1	3 00	102.
Jan., 1899	Burlington Route	Siding to Arion	2.4	1 20	108.
March, 1901	Plant System	Fleming to Jacksonville	5.	2 30	120.
Jan., 1903	N Y Central and Hudson R.	Palmyra to Macedon	7 29	4.00	109.35
April, 1904	Michigan Central	Crisman to Lake	3 73	2 00	111 90
July, 1904	Philadelphia and Reading	Egg Harbor to Brigantine Jct.	4.8	2 30	115 20
Oct., 1904	N Y. Central and Hudson R	Croton to Ossining	3 51	2 00	105

FASTEST RECORDED TRAIN RUNS BY ENGINES OF FAMED "999" CLASS.

train back and forth. Then for something more than a year 999 disappeared from the view of admiring railroad men, and every one thought she had drawn her last sigh and run her last mile.

But the shopmen of the Central knew that 999 had some great stuff in her yet. They put her on their operating turntable, amputated all the lop and sag that the weight of years had inflicted, and gave her a new body.

When they had finished their job there was not much left of the original locomotive, though, if engines have hearts and souls, old 999 still lives in fact, and is still able to carry the honors which have been the symbol of speed to schoolboys of this country for a generation.

No engine is better known than 999.

Gained Celebrity at World's Fair.

Its crown was gained in 1893, following the World's Fair at Chicago, when it hauled the famous Empire State Express and set a mark for all other rail fliers.

Of course, it looks like a pygmy to-day alongside the great superheaters, but in its heyday it was considered perfection in locomotive construction. We do not try any more to see how fast locomotives can be made to go, but it is improbable if any of the larger engines of this day could get over a division with greater speed than 999 when in racing form.

Nine ninety-nine was built at the West Albany shops of the New York Central Railroad. One of the first pilots of the racer was Charles H. Hogan, now assistant superintendent of motive power for the Central at Albany.

The engine was the crowning achievement of speedy locomotive-building by the late William Buchanan, superintendent of motive power of the New York Central Railroad in the late eighties.

He brought out a number of engines at the Schenectady works with 78-inch driving-wheels, and all were fast. The most famous of these was the 870, which hauled the Empire State Express between New York and Albany.

Buchanan Also Designed the Wangaroo.

In 1892 Mr. Buchanan designed 903, nicknamed the Wangaroo on account of its big drivers, which were 87 inches in diameter. Never before had such large wheels been applied to a successful steam locomotive.

The speed of these engines attracted attention, but Mr. Buchanan decided that he could construct a still faster locomotive, so he drew plans for the ideal racer, and personally conducted the building operations at the West Albany shops. The result was 999. It was magnificently finished and appointed, and has been likened to a piece of jewelry.

When this engine was put on the tracks it won instant curiosity, and every schoolboy claimed it as his ideal of speed. 999 went on to the sides of toy engines everywhere, and came to represent the most famous engine of the day.

Mr. Buchanan used 86-inch driving-wheels on this engine. Its work was hauling the crack Empire State Express between Albany and Syracuse

The standard size of driving-wheels on the New York Central now is 79 inches.

"ACT OF GOD."

BY CHARLES W. TYLER.

"Man Failure!" Cried Headquarters after the Wreck; But the Coroner Had a Different Finding to Record.

THOSE old railroad vets with empty sleeves and stumpy wooden legs who preside at the grimy little crossing and switch shanties, or, possibly, the gray-haired conductor on the limited who is a finger or so shy, will tell you of the old days on the Hill Division: when it was pile out on to the "hurricane-deck" in all sorts of weather to "twist 'em up"; when it was jam and jump and couple with the antiquated link-and-pin; when it was trust to Providence and a sleep-hungry operator for a safe "meet" somewhere out in the mountains, or a storm-beaten flagman failed to get back his distance.

But that is gone. The Hill Division is now a part of a great transcontinental system, and operation of its mighty modern trains is as safe as engineering efficiency can make it.

Though through the years there have come down the way *three* factors of the railroad game which are still beyond the control of American ingenuity, of headquarters, or the I. C. C. to regulate. They were the inevitable triangle which men had to face in the old times out along the Iron Trail; they are unchanged to-day.

Man failure! Mechanical failure! And that accident which is due to natural causes and could not have been prevented by any amount of foresight. Defined by the law, this is an "act of God."

And it was an act of God that played a big part in the life and happiness of a Hill Division engineer and the little woman who watches over his well-being when he is at home, and looks to the Almighty to keep up the good work at such times as he is driving engines out in the hills between Gunnison and Clear Lake.

The crew-despatcher started it. He was short-handed, and had to have a man quick. He jerked down a receiver and fired a number at Central

Andy Conahan relinquished sleep slowly, stubbornly. For some moments he lay staring into the blackness of the room; then breathed a subdued malediction on the source of the disturbance, a vexatious note that was repeated with shrill, jangling insistence.

"Andy, are you awake?"

It was the voice of his wife at his side—a wide-awake, alert voice that bespoke the fact that she had been perfectly conscious of the telephone's shrill summons for some time.

"I certainly am! How long has that thing been ringing?"

"About ten minutes—off and on."

"Well, for the love of Mike! Why didn't you call me?"

"Because you were dead tired and needed the rest."

Her tone was half solicitous, half defiant.

"You haven't been in bed three hours. I was hoping that you wouldn't hear it. I shut both the kitchen and the hall doors, and was just going to hang a blanket over the plaguy thing."

"Well, I've got to see what they want.

It might be a call for the wrecker, or some fool special."

And Conahan swung his feet to the floor, yawned, then groped for the light

His wife listened anxiously to the brief half of the conversation that came to her from the living-room.

"They want me for the second section of one of the fast freights — second No. 502," was the engineman's terse explanation. "Two o'clock out of the house. I've got to hustle; it's a short call. Howe is sick."

"And you're going?" blazed the woman suddenly, with feminine rebellion at the apparent imposition. "Andy Conahan, you were all in when you got home, and you look as though you had been dragged through a knot-hole now. You have no business getting on to an engine. Your rest isn't half up, but here you are tearing off with less than three hours' sleep!"

"Oh, I know," mumbled Conahan, struggling into his working-clothes half mechanically. "But the records at headquarters show that I was off duty something like ten hours ago, out there at Eagle Bridge. The despatcher's office doesn't consider that time should be taken out for reason that the extra I had to deadhead home on was held up at Moosehorn six hours because a double-header was all over the ground."

"Yes, and there was a lot of things they don't stop to think of!" flashed the other. "But one of these days, or nights, or whenever it happens to be, *Mrs.* Conahan is going to answer that telephone!"

And still saying unkind things about the embargo-hampered, boom-harried Hill Division, the little woman slipped into a dressing gown and quickly prepared the unscheduled meal, and put up the time-stained basket for this man of hers—this nomad of the railroad game whose comings and goings are responses to the whims of ever-restless, thundering trains, and demands which govern his being every minute all through the hours of day and night the clock around

And to-night, with the caress of his wife still warm on his lips, Andy Conahan went out to his run in the cab of a great consolidation at the plumed and battling front of second No. 502, eastbound on the Hill Division.

In the heavy, silent blackness of the hours before dawn, second No. 502, yelping a shrill acknowledgment of a signal-mast's red, merging into a clear-flaunting green, swung confidently past the tower at Silver Falls, across the maze of switches and tracks of the interlocking with clamorous complaint of speed restrictions, clattered noisily over the 2-Yard cross-over with a sighing hiss of releasing air; then lunged suddenly at the curve at CX with a triumphant crash of deafening defiance from her squat stack.

With the open country ahead, Andy Conahan, perched on the right of the superheater's cab, latched the champing reverse lever back a few notches higher on the quadrant, eased the slender throttle in just a little, shot a keen glance at the illuminated dials which registered the pressure of train-line and reservoir; for a second time studied several crumpled, yellow train-order tissues against the gleam of a gage-light; then settled out against the padded ledge of the open window for the long, battling run

Meditatively his mind reviewed the schedule of those things that are always foremost in an engineman's brain. There was a meet with No. 505 at Indian Head. The latter, the famous North River Limited, was running two hours late

First and second No. 502 had one hour and thirty minutes on No. 508; No. 508 would head in for them at tenth section. There was an extra to clear them at Roaring River and a double-header at Round Mountain Siding.

Then there was a water-stop at Moraine, at Dryad, and at Index. And that was all to date—all except the human equation which had to do with the handling of the giant freight-engine at the front of second No. 502.

And he, Conahan, was even now—even in these first smashing miles of this run, bathed by the warmth from the great boiler-butt and rocked with the ceaseless lurch and sway of the 248,000 pound machine — fighting off the pangs of a haunting sleep-hunger that gripped him mercilessly.

Grim and always persistent demons weighted his lids till it was an agony almost unendurable to hold them open. His brain fought to retain its clear conceptions of things—fought to master the weariness that was upon him, that he might be always keen, alert, the clear-headed man who can be no less than a man and play the game up in the cab of a locomotive.

A numbing mist engulfed his faculties. Torturing saturns invited him to their lands of drowsy repose with soft and alluring promises of such a tiny lapse. They beckoned and grinned and ever settled more leaded weights on his tired lids

Stubbornly he fought them off, but always they danced away only to spring again to the attack in ever increasing numbers.

He was still mechanically battling against them when the crash of the racing drivers beneath him and the sharp crack of the exhaust on the boiler-front dimmed in his ears, echoed for a moment in receding chorus—and suddenly was lost in a far and hazy nowhere.

There was a brief minute of unconsciousness, and he was back with a startled jerk, erect and staring

A station, black and uninviting, loomed in the night; switch-lamps twinkled beneath him, and they were crashing through a yard. It was Moosehorn.

Conahan muttered an oath and shifted his position, dropping slightly forward and leaning a little farther out of the cab that he might feel the fuller slash of the wind in his face

"I'll have to get down on the footplate and take a crack at firing the mill to knock some of this blasted sleep out of my system!" he fumed. "I'm getting to be a regular old woman, and the 'hut' of a fast freight-hog isn't any place for a man to get into the habit of dozing!"

Half an hour passed.

"Billy!" said Conahan at length, in final desperation. "Get up here and take her for a way. I want a little exercise."

"Go to it!" assented the fireman. "Fire her pretty light down front. I nearly plugged her arch before I knew what she was going to do."

The engineman, rejoicing in the physical exertion of again having a scoop in his hands, and in the pleasure of "keeping her up ag'in' the pin"—which is an art all its own — cleared himself, as he thought, of the last vestige of the desire for sleep.

In the argot of the railroad tongue, he put the black on to the white —bailed the black diamonds into her—for forty minutes; then refreshed himself with a cooling drink from his fireman's water-jug, and again climbed back to reclaim his seat at the throttle.

Second No. 502 cleared No. 505 at Indian Head, as designated in the train-order previously issued at Clear Lake, and resumed her flight into the east.

At Roaring River the distant signal below the bridge was red, while far up the main line the tail-lights of the Ishmael extra that would go in for them here blinked impudently in their distant security as the lumbering train ahead grunted laboriously into the clear for the manifest night flier.

And with eight minutes lost thereby, second No. 502 resumed her battling advance as she pounded out along the banks and fills of the white-flecked river that threaded its way west to the streams of its source among the high-flung crags of Fifteen-Mile Hill.

And while the searching finger of the headlight's rays on second No. 502 slashed the black shadows of the cut at Baker Bridge, the glittering red markers at the rear of the first section were blink-

ing their way through the blackness of the wooded slopes at Buckland—exactly two miles and a half to the eastward.

Even with the eight minutes lost to the second section at Roaring River, this placed the two trains nearly three miles nearer each other than they had been when they thundered past the dimly lighted tower at Silver Falls, an hour and fifty minutes earlier.

And this, in the order of things, was all wrong. However, it explained the tardiness of the extra just cleared in getting out of the way of second No. 502.

Also, in consequence thereof, it could have been estimated that at not greater than ten miles east the latter train would be on the first section's cautionary block.

Delving further into the contributory causes leading to subsequent crisis, it might be explained that at Eagle Bridge the road-hog pulling first No. 502 had developed a case of leaky flues. Nothing alarming, to be sure, at the outset; just enough to knock her steam down a little.

When she swung through the sag at Elmwood, and immediately thereafter got a taste of the grade on Fifteen-Mile Hill, her engine was steaming very badly, and she was losing time steadily.

It was three miles east of Moraine. Conahan's gaze was playing along the right-of-way, studying two eyes of green high on a gray and silent semaphore-mast. He watched them jerk to a flaring red and a placid yellow as his train thundered into the block. And once more came the stubborn inclination to drowse.

Their progress was slower now. They, too, were feeling the resistance of the grade on the "hill," though second No. 502 was mowing down the miles with the steady, powerful stride that bespeaks a smooth-running train and a "smart" engine.

The engineer and his fireman were alone in the big consolidation's cab. Back at Moraine the head-end man had gone "over" for a bite in the caboose. Only Conahan now was in a position to follow the challenging eyes of the automatic signals which punctuated the right-of-way.

And always the sleep-hunger haunted him, clung to him over each mile with increasing persistence.

He leaned out to watch the whirling drivers which crashed below him, then turned his eyes to where the fireman was swinging backward and forward across the deck, silhouetted against the night beyond by the intermittent flooding flare from the opening and closing fire-doors, and once more directed his gaze at the blackness and two more glittering specks of green ahead.

Then—for just the fraction of an instant—he yielded to that ever-luring temptation to close his eyes. It was to be for only a moment—just to rest them a little.

They were fearfully tired, as was his whole being. There was a flutter of the lids, a brief blinking resistance. That was all.

The instant's respite lengthened into a minute; into two; while for Andy Conahan there came an utter oblivion. The motion, the iron thunder of their going, was suddenly lost to him as completely as if he had been swiftly transported to a far and tranquil land by the breath of a great magician.

His head sank forward slowly till his chin pillowed on his chest, and instantly there was a slacking off of his whole tense poise. He slumped slightly back against a corner of the cab; his left hand slipped from its rest on the ET valve-equipment to his side; his right flexed limply against the padded window-ledge; while his entire system apparently gave itself over unreservedly to an exhaustion born of too long hours on duty without sufficient intervals between those jangling summons of the telephone.

Three minutes passed; then a fourth—and a fifth.

Second No. 502—painting her hard-fought advance with plumed and sifting

clouds of back-blown smoke and steam, bathed by punctuating flashes of gold from a white-hot fire-pit—snorted noisily into the next block.

And once more two welcoming eyes of green saluted her going with a transitory glow of protecting "home" and "distant" lights.

Yet, as the second section of the fast freight pounded on to the sweeping arc of the Dome Rock curve, a yellow-eyed caution signal, winking beneath a companion dot of green, winked its solemn warning in the night far around the bend to the west.

With unslackened pace the powerful consolidation whipped her trailing string of multicolored freight-cars past the block-limit post and through the entire length of the distant signal's circuit, square into the face of the undeniable and positive challenge of the home signal —of the red light at the masthead of the succeeding semaphore.

And still there was no sudden silencing of the exhaust, no touch of brakes against the wheels back of the grimly menacing advance of the charging boiler-front. For there was no awakening in the eyes of Conahan.

Even with the twin dots of crimson at the rear of the slow-moving caboose on first No. 502 less than a hundred feet away, while the white beam of the other's headlight played full on the gray-faced figure of the flagman as he sprawled off the steps with grotesque abandon, there was a chance. But quickly it was gone.

Second No. 502 lunged nearer.

A frightened and frantic flagman, stumbling back along the tie-ends, hurled his lanterns in final desperation at her cab. And amid a shower of breaking glass Conahan came to himself, while in the first half-conscious fraction of his awakening his hands were automatically jamming in the throttle and snapping the handle of the "air" into full emergency.

He became dully aware of the fireman's shrill, warning cry: "Con! First No. 502! We're into 'em!"

Then came the crash.

The jarring impact which followed merged its ominous crunching note with the swift mental arraignment, the self-condemnation in the soul of Conahan, as he realized the guilt of his unpardonable sin.

The heavy freight-hog tore into the light caboose as if the latter were of pasteboard construction — splitting it clean. And, locked in a tangled mass of steel and iron and wood, first and second No. 502 came to a buckling, grinding stop.

Panting and hysterically profane, the first section's rear-end man confronted Conahan beside the wreckage.

"What's the matter with you?" he stormed. "Tell me that! Didn't you get our blocks back there?

"What were you doing—running that red board? Were you asleep, you fool? Har-r-h?"

Conahan, however, ignored the sudden tirade. One terrible thought was uppermost in his brain. He clutched the other by the shoulder and swung him half-around.

"Your conductor!" he demanded. "Where was he?"

No other thought was in his mind but for the life that perhaps had gone out because *he*, in a moment of absorbing weariness, had yielded to the temptation to close his eyes for that ever-plausible, thin-ice intention of "just a minute."

The flagman only shook his head hopelessly.

"The last I saw of him he was at his desk, slumped down in his chair, looking out of the window. I hollered at him, and told him you were crowding us, but he didn't answer. That's all I know: I hit the grit then to get back and swing you up. But you kept coming and coming."

The body of first No. 502's conductor was found beneath the wreckage of his caboose. He had finished his night's run in eternity. And thereby was a manslaughter charge raised above the head of

the man who had been pulling second No. 502—Andy Conahan.

"Man failure!" cried headquarters. "Too bad! Too bad! We might forgive Conahan because he ran a signal and jacked up a tail-end. He's a good engineer, and he's been working pretty hard.

"But when he killed Bert Stockwell, it took the case out of our hands. The law will push it. It's likely to go hard with him. They've got a clear case."

The brotherhood took up his bond, and the white-faced engineman went home to that loyal little woman who was waiting to comfort him, to take him in her arms and give him all the sympathy and tenderness of which her kind are capable—can give to those they love.

"You mustn't let it get you too hard, Con you mustn't lose your grip, man o' mine," she consoled him. "Everything will come out all right—somehow. *Something* will turn up. The lawyers will find a way." And with a flash of spirit:

"They've *got* to!"

But the man shook his head gravely.

"I don't know, girly. It looks pretty black just now. You see, I came across clean. I didn't hold out anything. I was asleep, and I told them so. I admitted it"

"No!" the woman blazed bitterly. "I don't suppose either that you told them you were running an engine when you ought to have been in bed that you hadn't the rest the law allows you, *not once* this week. Nor last, for that matter; or the week before that!

"Oh, it isn't fair! It isn't!"

Then the tears came.

"It doesn't make any difference," said Conahan soberly. "*I* was pulling the job, and I ran a red board and the flag, then went into 'em all over. That part of it is clear enough.

"There is no excuse. I won't squeal. I took the call, and I fell down on it God pity poor Stockwell's wife and kids!"

"Yes, I know," murmured the other softly now. "But, oh, if he *could* only have gotten out!" Her ever-present loyalty overshadowed all else.

"Why *wasn't* he watching? How could you come up so close behind him and he not hear the terrible racket those big engines make when they're working steam on the hill? It's something I can't understand. I can't!"

And evidently, too, this was a phase of the situation that came to the attention of the time-seamed coroner.

Was something wrong that night, not only in the cab of the engine on second No. 502, but in that dimly lighted caboose ahead as well? And conducting his investigation carefully along these lines, he found the answer

As the strange verdict the official of the inquest finally returned concerning the criminal responsibility for the death of Bert Stockwell became apparent in its full significance, something suddenly surged up into Conahan's throat that interfered with the words that sprang to his tongue. His hands, however, went out swiftly in search of his wife's trembling fingers, and clung to them.

"We concede," said the coroner slowly, briefly, "that it was a temporary lapse man failure, as it is sometimes called—which caused this wreck out on Fifteen-Mile Hill. There, nevertheless, the engineman's part ends. There are no charges to be preferred.

"I have proved it to my entire satisfaction. Like old Joe Hadley and Mason and others of the Hill Division's men I have in mind, the conductor of that fast freight went out at his post—of *natural* causes

"So it will, perhaps, be as well to merely refer to this thing as"—his eyes lingered for a fleeting instant on the face of Conahan and the little woman there beside him, and softened—"an act of God! Stockwell died of heart failure! He was gone long before the freight-engine on the second section plowed into the rear end of first No. 502!"

WHAT CAR SHORTAGE MEANS.

Insufficiency of Ships and Delay in Unloading Render Embargoes Necessary to Keep Food-Supplies Moving.

BY MARLEN PEW.

JUST how dependent the people of this country are upon railroad communication becomes vividly apparent when the giant transportation wheel is temporarily thrown out of commission.

With freight shipments tied up for even a single day, the panic that seizes the people, and with just cause, is an indication of the true extent of the public service rendered by railroad men. During the early months of the present year a combination of circumstances resulted in a freight congestion which was admittedly one of the most serious blockades ever experienced in the United States, serving to remind both the public and the railroad managements of their interlocked interests and inseparable responsibilities.

Near Breaking Point.

After a twelvemonth of phenomenal activity, in which the total railroad revenues were in excess of three and a third billion of dollars, the transportation lines commenced the current year so weighted down by the stress of all descriptions of shipping that every wheel in the mammoth machine was taxed to its maximum capacity.

Early in the month of February, however, there were loaded upon the interstate carriers a mass of straws which came near to breaking the camel's back.

For financial and practical reasons, the railroads have not recently been adding extensively to rolling-stock equipment; at least the car-building was not in proportion to the demand for cars in 1916. This seemed to be good business reasoning, too.

It is not possible for the men responsible to the stockholders of the railroads to anticipate in advance the prosperity or ill-fortune of the national institution, and it is a difficult matter for them to decide whether to prepare for feast or famine.

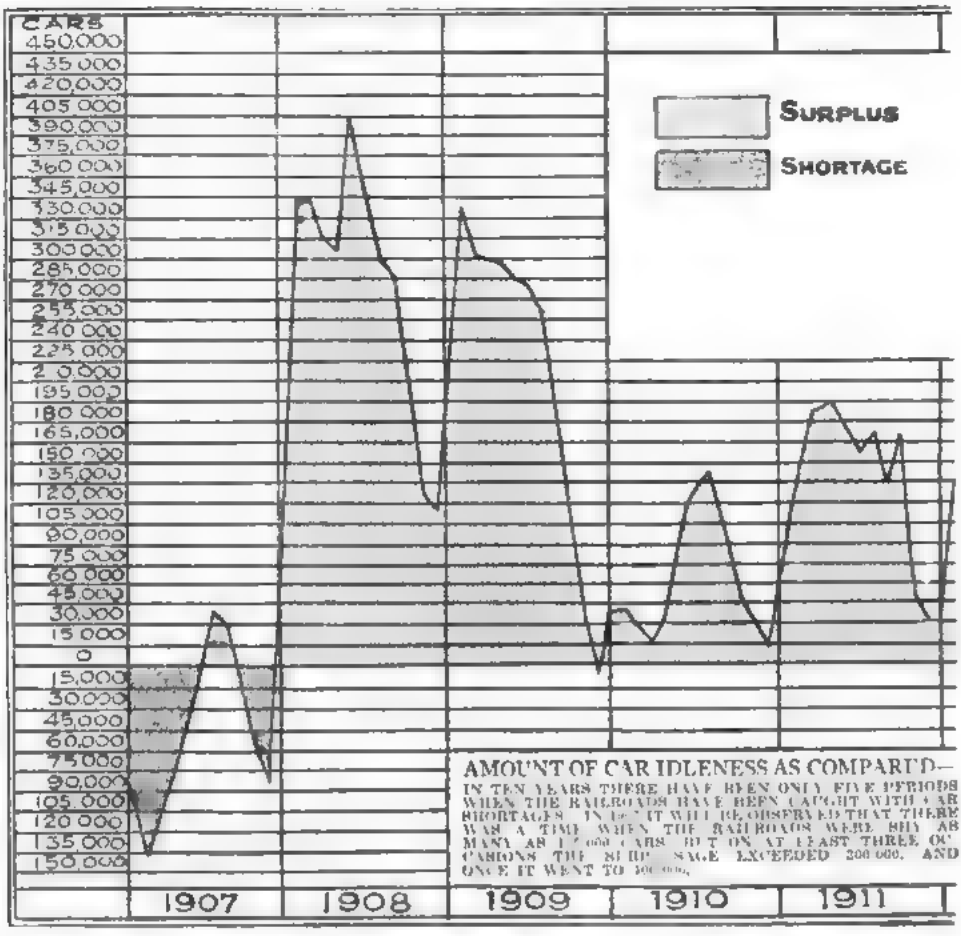
Car Shortage Facts.

Prosperity or depression in the United States may come very suddenly. When the feast is in progress, the railroads may not possess the dishes to serve all of their guests. When reverses come, they may have so many dishes that they don't know what to do with them, and they pay a pretty penny for idleness of equipment.

In ten years there have been only five periods when the railroads have been caught with car shortages. In 1907 there was a time when the railroads were short as many as 135,000 cars.

There were indignant cries from shippers and the public at that time; but the fact was that if the railroads, by some magic, had been able instantly to build the necessary cars to carry the big bulge of traffic, they would have been in very serious difficulty within a few months because of the expense of carrying a vast surplus of equipment.

For, as the accompanying chart shows,



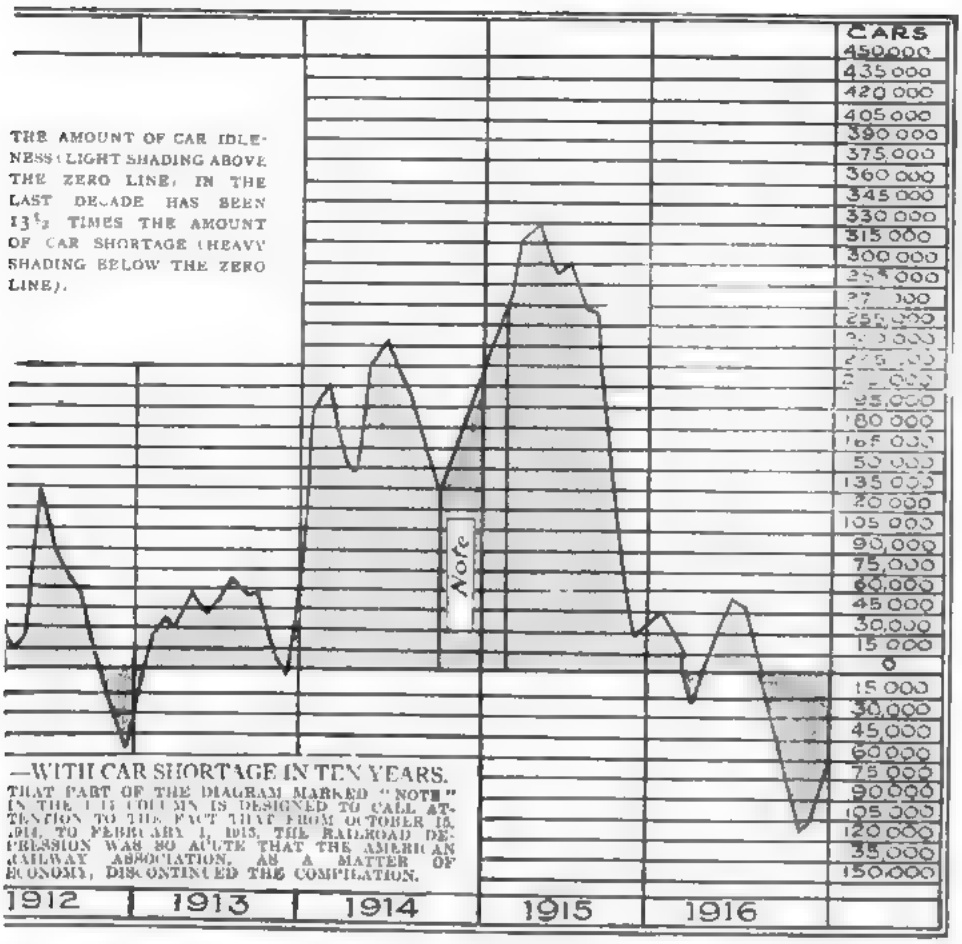
by the middle of 1908 some 400,000 cars were idle in the United States, rusting on every side-track from the Atlantic to the Pacific. There was a heavy, though fluctuating, surplus of cars until the fall of 1912, when a burst of prosperity brought about a shortage of some 50,000 cars.

This was of short duration, however; and then until the spring of 1916 the country was littered with idle cars. From October 15, 1914, to February 1, 1915, the net car surplusage was so large and railroad depression so acute that the American Railway Association discontinued the compilation of surplus cars. There must have been upward of half a million idle cars at that time.

There was a moderate car shortage early in 1916, but during the summer the railroads were able to handle all of the business offered, with a number of cars to spare.

However, from midsummer the subsequent wave of prosperity began to gain impetus, and by the opening of 1917 the railroads could have used more than 100,000 additional cars, if it had been possible to obtain them.

Counting every day in the life of a freight-car as a "car day," the records show that during the past ten years idle car days numbered 423,183,191. The periods of car shortages aggregated only 31,543,316 car days—fair proof that the railroads of the country have been really extravagant in the purchase of equipment: though when a car shortage ap-



—WITH CAR SHORTAGE IN TEN YEARS.

THAT PART OF THE DIAGRAM MARKED "NOTE" IN THE LITTLE COLUMN IS DESIGNED TO CALL ATTENTION TO THE FACT THAT FROM OCTOBER 15, 1914, TO FEBRUARY 1, 1915, THE RAILROAD DEPRESSION WAS SO ACUTE THAT THE AMERICAN RAILWAY ASSOCIATION, AS A MATTER OF ECONOMY, DISCONTINUED THE COMPILATION.

pears and becomes acute, there is tremendous clamor against the steam-carrier.

It has been estimated that the loss to the railroads during the past ten years on account of idle cars has been $1,057,957,977.50, because shippers did not have the freight. On the other hand, the railroads suffered a loss of $78,858,290 during the ten years because they did not have sufficient cars when the floodgates of commerce swung wide open and every fellow wanted to ship goods at one and the same time.

Ten years ago the railroads had 1,840,000 freight-cars, but at the opening of the present year they had 2,518,855, an increase of 678,000 cars. The new cars were of improved quality and size, and the load-carrying capacity had been increased 60 per cent.

These figures must be taken into consideration by those who are wont to criticise the railroads for failure to build more cars in 1916

When traffic lines are glutted with surplus freight beyond their capacity to move, the only means left open to railroad managers is to declare freight embargoes. Such means of meeting difficult situations were adopted twice during recent months.

With thousands of loaded cars stalled at the great traffic centers, side-tracks swamped everywhere with merchandise, and with freight stations throughout the country fairly bursting with cargoes demanding shipment, the situation by the

middle of February was so acute that the representatives of thirty great railroads met at Washington and made plans to meet the situation.

Of course, first consideration was given to the welfare of humanity. The people must have food and coal to live, and, therefore, these primal necessities were given preference.

The railroad agreed that there should be a virtual embargo against shipments for export from Eastern ports, the idea being that, while war stricken Europe might sorely need American products, "true charity starts at home."

Empties Sent to Middle West.

The car shortage seemed at the time to center in the middle West, so it was decided to send, by arbitrary means, long trains of empty cars thither from the East without delay.

At about this time the submarine warfare affecting neutrals was in full swing. Due to the failure of ships to leave the Eastern ports, there accumulated on the docks, in storage-houses, and freight-yards mountains of freight, a volume perhaps never before equaled.

The railroad men declared that the ships would have to clear away this accumulation before they would use their cars for export purposes, further to aggravate the blockade.

In Chicago, at one time, more than 30,000 loaded freight-cars were sidetracked. Similar conditions prevailed at many other large centers.

The railroad men attempted with some success to segregate the cars containing food and fuel from the mass, and moved these first. Trains fifty cars long, carrying grain, were rushed East from Minnesota when the cry went up from the Atlantic seaboard that the supply of cereal foodstuffs was short.

There were some instances where passenger traffic was curtailed in order that the railroad facilities might be applied to relief of the freight-blockade.

Shippers in nearly all lines were affected, and their losses were heavy. Steel men particularly complained that they were unable to fill orders.

Thus in thousands of ways the freight congestion ramified, to the embarrassment, loss, and actual suffering of the people. A variety of causes of this congestion were assigned, the whole making up, as it were, a veritable conspiracy of the fates.

In the first place there was abnormal demand for merchandise, both for export and for domestic use. Shipments had been increasing almost daily for months. The war situation and domestic conditions had driven prices up to amazing heights in many directions, particularly as regards foodstuffs, and producers were anxious to unload their stocks at the high levels. They all began to unload at about the same time.

The extremely cold weather in the West hampered the railroads considerably.

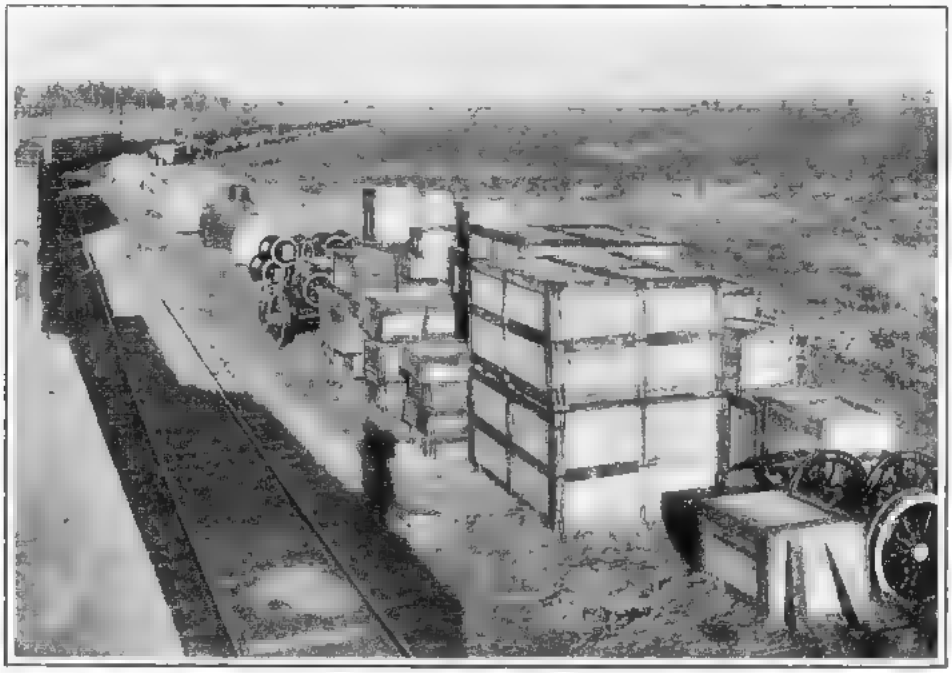
In Canada the roads were short of men, and, besides, were busily engaged in moving war supplies, so they had been unable to meet the demands of shippers. These circumstances tended to congest many of the northern railroads of the United States.

The railroad presidents also asserted that they were finding it difficult to obtain sufficient labor, especially practical railroad men, to meet requirements.

War a Cause.

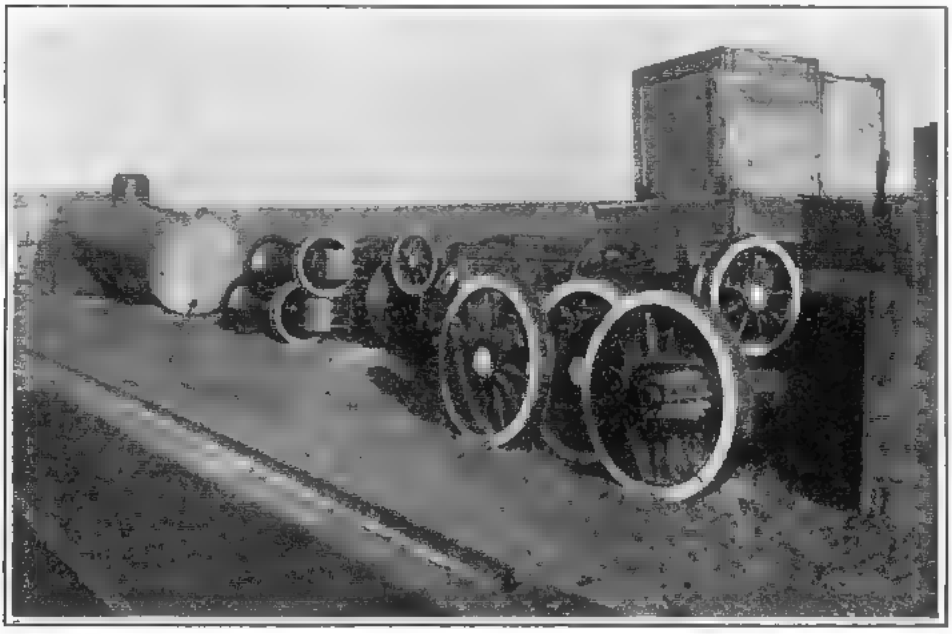
A very important cause was the abnormal condition of traffic all over the world due to the war in Europe. The congestion that started at English ports at the outbreak of the conflict had spread to the East, and almost over the entire world shipping schedules and the routine of commerce were unnatural.

Long before the diplomatic break with Germany the United States had paid a terrific price in disturbed domestic conditions on account of the outburst of passion and the scourge of death and destruction across the sea



JERSEY CENTRAL FREED LITERALLY MILES OF FREIGHT-CARS BY EMPTYING OUT THEIR CONTENTS ALONG THE RIGHT OF-WAY

From a photo by Brown Bros., New York



RUSSIA BADLY NEEDED THE RAILROAD ENGINES OF WHICH THESE ARE PARTS, BUT THE TERMINAL WAS OVERLOADED AND THE RAILROAD HAD TO HAVE CARS TO CARRY FOODSTUFFS. SCENE IS NEAR BAYONNE, NEW JERSEY

From a photo by Brown Bros New York

With the declaration of the submarine blockade by Germany, the freight congestion became almost instantly acute. It fell to the lot of the railroad managers, in consultation with the Interstate Commerce Commission, to take matters in hand and start a systematic regulation of traffic.

Few realize to what tremendous dimensions the export trade of the United States has expanded during the past two years. We have been pouring into the ports of the Entente Powers the substance for the very existence of the people, not to mention colossal supplies demanded on the fields of battle.

In 1916 our total exports of merchandise were valued at $4,333,658,865—just about three billion dollars more than we sold abroad in the year 1900.

The marine shipping scenes of the great Eastern ports during the past two years, despite the hazards and handicaps of maritime trade, have been characterized by startling animation. The port of New York has been a veritable boiling pot of activity, and every railroad yard of the metropolis has daily contributed vast amounts of freight destined to the wharfs or lighterage barges.

Exports of More Than $2,500,000,000.

During the year the nation sent to England $1,409,199,584 worth of merchandise; to France, $630,672,504; to Italy, $270,489,922, and to the Russias more than $300,000,000. These countries were our greatest customers, but we sold to all the civilized world, except the blockaded Central Powers of Europe

The largest items were explosives, foodstuffs, iron and steel manufactures, leather, oil, copper, cotton, automobiles, and horses and mules. This store of wealth came from every section of the United States, and practically every dollar's worth of it had to have domestic transportation to reach the waiting ships

To handle the big foreign and domestic shipments, railroad men all over this country have been stepping in lively fashion. The clerical forces in the freight departments have worked dizzily by night and day to keep track of the progressively increasing volume of business.

Never before have they experienced so many "rush" freight orders. Every one seemed to want immediate delivery of goods.

So great has been this pressure that there has been an enormous overflow to the express companies, and it has become a common practise to transport rush freight of all classes, from automobiles to iron ore, through at express rates in express cars.

Freight-Cars Speeded Up.

The average freight-car travels faster in the United States now than ever before. The average distance covered by cars on 46 lines furnishing statistics in 1916 was 29.03 miles per day.

Three years before this the average distance that a freight-car traveled on the same lines was 26.69 miles

The freight pressure, however, demanded better time, so in October, 1916, on 35 roads the average traveling distance per freight-car was 32.17 miles per day.

This may seem slow, but these figures do not indicate the average speed of cars when they are made up in trains. The averages were found by dividing the total mileage made by all cars in a given period by the total number of cars in service. Therefore, the time indicated included all of the operations of the car, whether still or in motion.

Unloading Delays.

It is the opinion of Mr. W. W. Atterbury, president of the American Railway Association, that the railroad equipment of this country is ample for normal needs if shippers and the railroads will closely cooperate.

He made the following statement to the Interstate Commerce Commission recently:

"I do not mean, when I say 'its normal needs,' the abnormal situations that may occur once in four or five or six years. I do not think that it would be the part of economic wisdom to prepare for a situation that occurs but once in four or five years.

"I do think that with the cooperation of the shippers and the railroads the shippers themselves can materially aid in this situation—that is, a situation of abnormally excessive business — if they, in turn with the railroads, would increase their facilities to unload within their plants.

"Here is an instance of what I mean

"In 1914 — I think in November or October—in Philadelphia, a certain railroad and its connections unloaded fourteen hundred cars. In order to do that it had a pot of about thirty-eight or thirty-nine hundred cars

"That is, its yards took care of that many cars, and those were the cars it had available immediately to throw into the industries in order that those fourteen hundred cars should be unloaded.

"In the following year that company had increased its yard facilities to such an extent that in the corresponding month of the next year it had about forty-five hundred cars as a pot, and the shippers unloaded about sixteen hundred, or an increase of about two hundred cars.

"This year the company increased its facilities until it had a holding capacity of nearly seven thousand cars, and yet the unloading increased only from sixteen hundred to eighteen hundred.

"That is, although the railroad had increased its holding capacity in the city of Philadelphia from, approximately, thirty-eight hundred to seven thousand cars, the shippers had increased their unloading ability but from fourteen hundred to about eighteen hundred

"The effect of this was to clear the running tracks. It did not release equipment at all

"Railroads can increase their facilities

WEST SHORE THREW THOUSANDS OF AUTOMOBILES ON TO THE GROUND IN ITS WEEHAWKEN YARDS, PORT OF NEW YORK THERE WEREN'T ENOUGH BOTTOMS TO CARRY THE STUFF OVERSEAS AND THE RAILROAD HAD TO KEEP ITS CARS MOVING, SO THE FREIGHT LAY WHERE IT FELL

From a photo by Brown Bros., New York

for holding at the big terminals, but they cannot enforce unloading. That has got to be done by the consignee himself."

Not Cause of High Food Prices.

According to officials of the American Railway Association, there is no reasonable basis for the charge that freight congestion or car shortage is responsible for the high price of foodstuffs at present. There has not been a shortage of flour and grain as the result of car shortage or congestion. As a matter of fact, there is little wheat, comparatively, for domestic use awaiting east-bound shipment in the middle West. Corn and oats abound, it is true, and these are mostly for export.

Dressed meats and packing-house products have been scarcely affected, since the packers for the most part own their cars and control their movements altogether. Nor has the movement of vegetables, butter, eggs, sugar, lard, onions, cabbages, chickens, coffee, rice, prunes, live stock, oatmeal, and many other food commodities been affected by car shortage. Together with fuel, government shipments, and news-print paper, they have been exempted from all embargoes when their use has been confined to this country.

In cases where embargoes restricting the acceptance and movements of foodstuffs and feed for animals for domestic consumption existed, they were canceled by the Commission on Car Service, working in cooperation with the Interstate Commerce Commission. This commission further facilitated matters by sending inspectors to all points where congestion was likely to arise, to report on stocks on hand.

Old, True Cry.

The cry against the unfair delay of unloading by shippers is an ancient one, but it is as material in the recent disastrous blockade as any other one factor. Obviously, if cars are to be long delayed by indifferent or ill-equipped shippers, they cannot be out on the line doing the service of other shippers.

When the tide of export trade suddenly swamped New York after the outbreak of hostilities, expensive delays were caused by an utter lack of facilities to meet requirements. However, during the past year these faults have been largely relieved.

A car shortage is not enjoyable to the railroads, as some severe critics seem to believe. The average earnings of a freight-car in commission are said to be at least $2.50 per day.

No practical railroad man is happy over the prospect of having a demand for a hundred and fifty or two hundred thousand freight-cars per day without being able to realize upon that demand.

Furthermore, it is the ambition of the railroads to deliver the maximum of efficiency in the public service, and there is no such electric criticism of the railroads in general as when shippers find it impossible to fill their orders owing to car shortage

THE MASTER MECHANIC SAYS:

A SHOPMAN who is afraid of getting oil on his fingers is as useful as a hand-painted ash-can.

FROM THE RAILROAD MAN'S MAGAZINE

THE JESTER ON THE CHI WIRE.

BY CHARLES WESLEY SANDERS.

Mulford Rigged a Merry Jape on the New Opr; But in the Long Run He Found Nothing to Laugh At.

(The telegraph office-boy talks.)

OU would have knowed Madigan was a reg'lar Reuben Glue the minute you laid your eyes on him. It was sticking out all over him.

The first day he came to work the other ops all grinned when the chief took him around to introduce him. He acted like a sheep, and he had a grin that looked like it was pasted on.

They was six of us in the office besides Madigan: Me and the chief; Mulford, who worked the Chi wire; Talcott on the Buffalo wire; Tuttle working the local wires that ran to other railway offices and down to our depot; Mitchell handling Western Union.

That left one opening on No. 2 wire, the local wire that ran over that district. McBride, that had worked that wire, had got a job on another road, running trains. If it wouldn't hurt anybody, I'd like to see him get 'em together.

The big shrimp! I ran more errands for him than anybody else, and he never give me a nickel. He'd walk past eleven Indians when he was out for his eats and then chase me out for a fi'-cent bundle of chewing when he came back.

I forgot to say I was the office-boy. So I had to chase out for the ops when they wanted anything, besides delivering messages all through the building from the president's office down, and carrying the mail from the post-office and back. Besides, I was learning to pound brass myself.

I was getting so's I could send pretty good, and if a guy went slow enough I could receive fair. I had made up my mind I was going to work that Chi wire some day or bust. Eighty plunks a month that pays.

Well, when the chief had introduced Madigan all around, he says to him:

"Mulford is going to dinner, now. You can relieve him."

It was kind of raw on the chief's part, because that Chi wire was the worst roast ever you saw. Mulford was a expert, and it was all he could do to keep fairly well cleared up. And they was a lot of forms, mostly for the car accountant, that Madigan couldn't know about.

It looked like he would get it put up his back right off the reel. But the chief believed in finding out how good a man was right away. He was the best op I'd ever seen up to that time, and of course he was standing by to relieve Madigan hisself if Madigan should get all tangled up.

Well, Madigan was the first new op we'd put on in the gen. offices in my time, so I wanted to see how he'd come out. He sat down and I went and leaned on his partition and watched him.

Mulford had been working with "BX," sending to him, and I was all of a shake when Madigan put his finger on the key when Mulford said, "Rlf, MD, DN." That meant relief, and that Mulford was getting up and Madigan was sitting down.

Well, Madigan took hold of the key and he gave half a dozen "I.I.Is." and then he stopped and loosened up the

screw a little. Mulford likes a stiff key, and I saw that this guy Madigan didn't. I kind of liked him for that, because I kind of like a easy key myself.

Well, when he got her fixed to suit him he started in. He took it kind of easy at first, but pretty soon he was reeling off that stuff like a house afire. He sent about twenty minutes, and he never broke hisself once. And when he was done he had all his messages checked up—checked 'em up with his left hand while he was sending, you know, you other ops—and he snapped the key shut and turned around to the old mill.

Now, this guy at BX was some op himself. Madigan had no sooner snapped his key shut than the guy at BX snaps his open.

"Hr. Anr," he says. "O.K. JO."

That meant that he had something to send and he was giving his "O. K." for what Madigan had just sent him. The way he jerked that out and started back at Madigan I looked for Madigan to get nervous.

But when I glanced up at his face he was just as cool as I am when I'm practising on my short-circuit. He gimme that Reuben smile and began to pound the mill

Well, BX had about ten messages, and Madigan took them without a break. Every once in a while he would look up and take a peek at the office—to see how he was going to like it, I guess. Once, on the level, I saw him go right on working that old mill when he wasn't looking at the keys.

"Well," I says to myself, "you work like you was taking a press report over to the *News* office, but I guess you'll get something handed to you when you come to some of them forms."

Pretty soon BX he says, "Hr. 37."

Now, that 37 was a long report for the car-accountant, showing movement of cars. It was all a jumble of initials and figures, and for a new man it was a bear to take

This Madigan just wheels around in his chair and picks up a pen and pulls out a pad of 37's. You ever see that show "Jim, the Penman"? It used to come to Peters's Theater here before the movies got so strong.

Well, say! Compared to this guy Madigan, Jim was just learning to write. Madigan's copy was just like this print you're reading now. I never saw anything like it.

He didn't swing his pen all over the paper like a lot of ops. He just jotted down those initials and figures without any lost motion.

Well, the guy at BX knowed he was a new man, and I guess that guy thought the wire had got grounded and Madigan had been cut off. For all of a sudden he stopped right in the middle of a 37, and he says:

"U tr?"

That means.

"Are you still there?"

Madigan snapped open the key and he gave one "I" and shut it again. BX goes at him hammer and tongues again, but Madigan he never bats an eye

Well, it was time for me to make the rounds again, and I gathered the messages off the hooks and sorted them and stuck 'em between my fingers and started. In the hall I run into Mulford.

Mulford is a good scout, but he is a big, two-hundred-pound guy not fat, I don't mean, but just big. And so, like most of those big guys, he has to have his little joke.

He's never so happy as when he's putting something over on somebody. One time he puts a can of water above the door for me to get a ducking from when I come in, but the telegraph super he came first through, me being polite and stepping back, and there was the dickens to pay.

So I thought I'd hand one to Mulford.

"Say," I says, "you might just as well go out in the street, turn north, and keep right on going till you come to the pole."

"What's eating you, kid?" he says.

"That guy Madigan has got it all over

you," I says, stepping back from him. "You ought to see him clear BX, 37's and all, and never open a key. Take a squint at his copy."

I shoved one of those gilt edged 37's under his nose and he looked at it.

"Well," he says, "he does throw a pretty good fist, doesn't he?"

He stood a minute, chewing his toothpick; and then he smiled. Then he chuckled. Then he laughed.

"A pretty good fist," he says again.

I was wise.

"Say!" I says, "you lay off that guy. Don't you go stacking anything up on him."

He slips me a dime, and of course that made a difference.

"You close your trap, kid," he says. "You do what I tell you to do."

When I came back Madigan was sitting in on the local wire, while Tuttle was out to the lunch counter. I wanted to hear some more of his sending, so I goes and leans over him. He was taking it slow and easy, spacing like he thought if he run a couple of letters together he'd lose his job.

"Hit 'er up," I says. "It's a long time since I heard anybody send like you can."

"It's Miss Haywood on the other end," he says. "She isn't so much of a receiver, you know. Let's give her a chance for her white alley."

Well, that was long talk for a new guy in the office. Instead of asking somebody to go easy on him, he was going easy on somebody. Son-of-a-gun if I didn't begin to like him more.

I probably wouldn't of liked him so much if he had been sending to some man. But this Miss Haywood at the depot was a doll. She was a little girl with a lot of hair piled which way on her head and the nicest eyes ever you saw.

Whenever I'd have to go to the depot on an errand for somebody she was there with an orange or some candy. Once she kissed me, but it was on the cheek and just a kind of a peck, and I stood for it from her.

"You know her?" I says.

"I dropped in there a minute when I got off the train," he says. "I didn't know how to get up here, so I asked her. She was real nice."

"You better lay off that stuff," I says.

"How's that?" he says.

"Why," I says, "Mulford is stuck on that little dame. Mulford is some kidder about everything excepting Miss Haywood. He'll fight about her."

"That so?" says Madigan, and he kind of smiled.

Well, the next morning Mulford comes to bat like I expected he would do in some way or another. Along in the morning he tips me the wink and I goes over to the Chi wire. A whole fat dime was laying right under my nose. I reached for it, but Mulford had his big paw over it before mine got there.

"Not so fast," he says. "You going to do something for me, kid?"

"Sure I am," I says, thinkin' he wanted some tobacco or something.

He took his hand off the dime and I grabbed it quick.

"Edge in," he says.

I draped myself against his shoulder. He slipped me a fat envelope. It was a blue envelope and it smelled like a drug-store.

"When you go for the mail at eleven o'clock, you just slip that into the office," he says. "Get it into your pocket now without anybody seeing it."

It was easy work for a fat dime, and I slipped the envelope inside my shirt. Then I went back to Madigan, whistling so's he wouldn't think anything was on.

I turned to give Mulford the wink and I could see he was laughing so hard he had to break. And the other guys was giggling like a lot of girls in school.

"Oh," I says to myself, "Mulford's got a hen on"

As soon as I was out of sight of the office I pulled that letter from my pocket. It was addressed to Mr. James Madigan in care of our railroad.

Well, I stood there a minute, staring at

it. I had a good notion to bust it open and have a look, but then I remembered I had been paid for mailing it, and with me a dime can't only talk, it can yell. So I chucked the letter in the box.

I wasn't at all surprised to see it in the big company mail-box next morning when I stopped for our mail on the way to work. I tucked it inside the bundle

As soon as I stepped inside the telegraph-office door the lads began giving me the wunst-over. Mulford squirmed in his chair and broke twice in half a minute. Finally he caught my eye and he raised his eyebrows and nodded, as much as to say:

"You got it, kid?"

I wunk back at him, and then he chuckled so he broke again. I don't know what the boys along the line thought of him breaking like that.

Well, pretty soon Tuttle says:

"Any mail for me this morning, my good lad?"

And the rest of them took it up. I said I hadn't anything for any of them, and then Madigan looked up from the No. 2 wire and he says:

"You got a letter for me, Tommy?"

"Yes," I says, and I tossed him that blue envelope.

He put it down on the table in front of him and looked at it as he sent along. I went through them offices with the mail like a flash. I guess I had the fastest fast mail skinned a city block.

When I come back to our office Madigan had got a minute and he was opening the blue envelope. When he finished reading the long letter in it he smiled. Mulford had a fit of coughing for a whole minute, and I could see the red sticking up in the back of Tuttle's neck.

"Well," I says to myself, "Madigan, you poor simp, you're a bigger one than I thought. I've a notion to put you wise."

But I couldn't afford to get the gang sore. They could have got my job if they'd tried. At least they'd never have given me no more change

Well, it come time for Madigan to go to dinner. It was a nice, sunshiny day outside, and Madigan brushed himself off and dusted his shoes and washed himself and combed his hair. And then he went out.

Well, they gave him time to get to the bottom of the stairs, and then they bust loose. Mulford pounded the desk like he would break his hand, and Tuttle laughed till he cried. Talcott and Mitchell giggled. The chief was out to dinner.

In a minute all of them stood off everybody they was working with and ran to the windows. I took a look myself. And down there in the street was that darn fool Madigan, parading up an' down like he was expecting to meet somebody.

The boys couldn't stay there, because they'd get piled up, so Mulford says:

"You watch him, kid. See what he does. Be sure to tell us if he meets a lady."

At that they all bellered so I thought the gen. super would come running from his office to see where the wreck was. Well, I watched Madigan, and all he done was to walk up and down out there till his hour and a half for his eats was all taken up. Then he come back to work without any victuals

All those other guys sit sad and solemn, and he plunks himself down at the No. 2 wire and begun to pound things out. Then "QN" and "DK" begin to work together on No. 2, and Madigan jumps over to the local wire, Tuttle having gone out for his eats. The depot answered him quick, and he begins his soft and easy sending to Miss Haywood. I went and hung over the partition.

"Say," I says, "ain't you afraid you'll rush her if you send like that? I can take that stuff myself."

"No," he said, "I ain't afraid I'll rush her, and I wouldn't if I could."

"Say," I said, "what was the big idea in the parade to-day?"

"What parade?" he says.

"Why, you," I says. "All you needed was a band and a calliope to be a circus procession"

"Oh," he says, "my doctor tells me I need exercise. He tells me to go without any eats at noon and get out and take the air."

I said at the beginning he was a Reuben Glue, but he kind of acted now like he knew his biz. I decided I'd keep my eye on him. Maybe I'd lay a little bet on him, not putting up any money, you know, but just pretending.

Well, the day after that along comes another blue envelope for him. It happened No. 2 wire was busy when I shoved the envelope across to him. He tore it open while all them ops piked him off. Mulford had a choking spell again, and Tuttle got red behind his neck.

Madigan didn't seem to notice. He plucked open the letter and read it through. Then he smiled kind of foolish and shoved it in his pocket.

Well, that noon it was the same stunt Across the street he goes and the parade begins. Them ops was lined up at the window wunst and he looked up. He seen 'em all, and he waves his hand and grins so's you could see his teeth that far away.

Well, he comes back, same as the day before, and his wire being busy, he hops the local wire again and begins his easy pounding. Once I seen Mulford looking at him kind of suspicious. But Madigan just sat there spelling out the Morse for Miss Haywood.

Well, that parade biz went on for about a week. Then Mulford and the other ops begin to get tired of it. When Madigan come back from his trotting up and down at the end of the week one day, Mulford walks over to him.

"Say, old timer," says Mulford, "you've been getting quite a lot of mail lately, ain't you?"

"A few," says Madigan, very calm.

"Well," says Mulford, "I thought maybe you'd like to read the originals of them."

Then he pulls his hand from behind his back and slaps a bunch of clip down in front of Madigan.

"I wrote 'em, and my sister copied 'em on that blue paper you got 'em on," Mulford says. "Did you think some swell dame was took by your looks?"

I looked for Madigan to go right through the roof, but he only pawed over the clip kind of indifferent like.

"Oh," he says, "then all those letters were just made up"

"They were," said Mulford. "But say, didn't they sound like the real thing?"

Then all the ops went off in an explosion. Madigan got kind of red, but he was a game guy, and finally he begun to laugh, too.

I supposed that was the end of that biz and that Madigan would begin to go out and eat his victuals like a regular human. But next noon I happened to look out the window at his eats time and I seen him.

"Say," says I to Mulford, "what's the big idea now? There's Madigan still doing his parade stunt. Maybe he don't remember that that was a frame-up."

Mulford was so surprised that he said, "Min." to the guy he was working with and he come over to the window.

"Well, I'll be darned," he said. "What do you know about that?"

"That guy's got a screw loose," I says. "You want to quit kidding him or you'll be landing him in a insane asylum."

Well, the rest of the ops come over to the window, and we stood there waiting to see what Madigan was going to do. Then all of a sudden Mulford leaned against the window and you could hear him breathe clean down to the street, I guess. His eyes was sticking out on his cheeks.

He seen her first, but I seen her second. And I knew her right off the reel. It was Miss Haywood, the lady op from the depot. Madigan lamped her, too, about that time, and he waltzed up to her and took off his hat real polite.

"Fer the love of Mike!" says Mulford in a kind of a whisper.

"I should think so," says I, for I was the only one that was wise about Mulford shining up to Miss Haywood, because I'd

taken notes down to the depot for him, him not wishing to say over the wire what he could say in a note.

"Why, that's 'WD' from the depot, isn't it?" says Tuttle, WD being Miss Haywood's sign

"One and the same," says I.

Mulford didn't say anything more.

Down in the street Madigan and Miss Haywood turned around and went away together. Mulford stood watching them till they was out of sight. Then he set down at his key and called the guy he had been working with. If old Mul would send like that all the time he could work all the wires in the office hisself. They wouldn't need no more ops than him. I thought for a minute he was going to tear that old key out by the roots.

Well, at his regular time back from lunch comes Madigan. There wasn't any laughs for him this trip.

Mulford give him an ugly look, but Madigan just sat down at the local wire and called Miss Haywood. She answered pretty soon and he begun to clear with her, and at that same minute somebody was calling him on his own wire, but he didn't pay any attention.

Well, that afternoon everybody left the shop ahead of Madigan and the chief. The chief always stayed late to check up on the messages to see that nobody had forgot to send any and slipped them in the box without any check on them.

Just as I was going out the door I heard Madigan say:

"Can I speak to you a minute, chief?"

"Sure," said the chief.

I listened in the hall, but I couldn't hear what Madigan said, for he must have whispered.

Well, next morning we was all on the job, me sorting the mail, when in blows a boomer. You can spot a boomer every trip. This guy was big and fat, with a hand like a ham. He looked like he had slept in a stock-car.

"Where's that No. 2 wire?" he says, and his voice sounded like a file on a rusty saw.

"Who do you want to talk to?" Mulford asked, him being chief before the chief got there.

"Anybody. Anybody," says the boomer very brisk. "Got orders to float in and work the No. 2. Just point it out to me and I'll do the rest."

He had shed his coat and hat by this time and he was runnin' his hands through his hair. You would have thought he was getting ready for a rassling match instead of working a wire.

"Where's Madigan?" Mulford asked, and his voice was so funny I had to give him the wunst over.

"Don't know," said the boomer. "Got orders to come and work the No. 2 wire. Where's the No. 2 wire?"

"Right in front of you," said Mulford, and he didn't seem to be thinking much about what he was saying.

In fact, his eyes was on the local wire where Tuttle was just starting in to clear.

Well, the boomer he drops into the chair and begins to show 'em how it should be done.

Mulford he gets up and walks over to the local wire.

"Tut," he says to Tuttle, "you sit in on my wire for a minute, will you? I want to call the depot."

Tuttle goes over to the Chi string and Mulford sets down at the local wire and begins to call the depot. The depot answers. By that time I'm right back of Mulford's chair.

"Wo?" says Mulford.

"GO," says the depot.

Mulford opens the key and sits rubbing his chin for a minute.

You see, there was a new op at the depot. Miss Haywood, as I said, signed WD, and this gink, whoever he was, signed GO.

"Wr's WD?" says Mulford.

"I don't know," says GO. "I got orders to relieve her last night."

I got it all O.K., because GO wasn't a fast sender.

Mulford opened the key again and rubbed his chin some some. Then he

looked over to where Madigan should have been setting. Then he looked out of the window.

Finally he give it up. He says "I.I.I." four-five times and then "O.K." and shut the key.

When he got up he saw me back of the chair. He gimme a shove that nearly knocked me over

"Get out of the way, you rat," he says, and you should have seen his face. It was black as the ribbon in his old mill.

"Fer the love of Mike!" I says. "What's eating you? Just because Miss Haywood is away at the same time you needn't get rough with me."

That seemed to make him madder 'n ever. Tuttle got up and he sat down and begun to do things to the Morse alphabet again. I never seen the Chi wire kept so clear as it was that day.

Well, next morning I had a letter for Mulford. They was something about the writing that struck me as familiar, but for a while I couldn't think what it was.

Then all of a sudden I tumbled. It was Madigan's copper-plate.

"Gee," I says to myself, "I wonder what Madigan's writing to Mul about? You wouldn't expect him to write to Mul after the way Mul ragged him on them letters."

Well, I laid the letter down before Mul after I'd distributed all my other mail. I didn't want to be busy when he opened it.

Well, Mulford looked at the envelope, and then he stopped sending and grabbed it up like they was money in it and tore the envelope open. Well, say, his face was like a villain in a movie after he had finished that letter. And he acted the part, too.

Very slow like he crumpled up that letter and tossed it into the waste-basket. Then he heaved a sigh and begun sending again.

But he didn't tear off the Morse. In fact I never heard his sending wabble like that before. He broke himself every few words, and he lost his place once or twice so's he had to ask the man at the other end "4," that abbreviation meaning, "Where was I?"

Well, I had to stand across the street till 'way past six o'clock before the chief left that night. Then I snuck back and rummaged in the waste-basket for that letter. Here she blows:

DEAR MULFORD

I'm telling you before everybody else that Miss Haywood and I were married last night. The chief has let me off for two weeks. Miss Haywood has, of course, resigned

I'm writing to you first, because I have you to thank for me getting Miss Haywood You know what I thought when I got those letters your sister wrote? I thought they were from Miss Haywood.

Once or twice I had held the sounder down so's the office wouldn't accidentally hear, and had asked her to meet me and go to lunch. The super's chief clerk often worked for her at noon if she wanted to be away longer than usual

Well, she wouldn't meet me. Leastways, she said over the wire she wouldn't. I thought them letters showed she wanted to meet me, but didn't want to say so over the wire. So I went and paraded and it was just a joke.

But before you told me it was a joke I got mad. I know I'm a rube, but I can get fighting mad sometimes. Seeing I went crazy about Miss Haywood the first time I saw her, I was determined I'd have a showdown. So I went to the depot one night and met her just as she was quitting

I told her about the letters, and she was mad, too. Then she laughed and said it was one of your jokes. Seems she knows you pretty well, from your calling at her house so often

Well, she said a swell dame *would* meet me the next noon, meaning herself; and she did, like you know. That's when you saw us. We saw you, too.

We went to lunch together, and — well, the wedding was last night. Sufficient!

The office boy told me you were ambitious in Miss Haywood's direction yourself, but you needn't hold anything against me on that account. You couldn't have won. She thinks you're a joke

JAMES C. MADIGAN

Whoever it was that said whoever gets the last laugh is entitled to a free ticket to the concert after the main show, spoke an earful for them jokers like old Mul.

RAIL HEROES HONORED BY U. S.

21 Medals Have Been Bestowed by the President for Life-Saving Exploits Along the Right-of-Way.

BY MARLEN PEW.

WHO is a hero?

The law of the nation defines a "hero," in railroad operation, as one who, by extreme daring, endangers his own life to save the life or limb of another, or in endeavoring to do so, in any wreck, disaster, or grave accident.

According to the latest information from the Interstate Commerce Commission twenty-one persons, sixteen of them railroad employees, are heroes and are in possession of the beautiful bronze medals of honor, with silk knots or rosettes for every-day wearing, bestowed by the Chief Executive of the United States, under the law of February 23, 1905.

The record of the daring acts of these

SIXTEEN-YEAR-OLD HEROINE

NETTIE CASKEY SNATCHED A CHILD OF THREE AND A HALF FROM IN FRONT OF A PASSENGER TRAIN, ROLLING WITH IT DOWN AN EMBANKMENT—THE ENGINE MISSED THEM BY A HAIR'S BREADTH

INJURED IN WORK OF RESCUE

GEORGE H. WILLIAMS, ENGINEER, SAVED WOMAN AT CROSSING, BUT WAS STRUCK HIMSELF, SUSTAINING INJURIES WHICH KEPT HIM FROM HIS REGULAR DUTIES FOR THREE MONTHS

From a photo by Elmer Chickering, Boston

heroes is one of the finest chapters in the annals of American railroad history. Two of the wearers of these medals of honor are young women, one only sixteen when her brilliant act of self sacrifice brought to her the official reward of a grateful public.

Burlington Freight-Train No. 72 had left Cameron, Missouri, on September 5, 1910, and had attained a speed of about ten miles an hour. Suddenly the crew saw an old man walking in the center of the track a short distance ahead

The engineer made the whistle screech, and the fireman rang the bell. As the man was deaf he did not get the warning; and at last the air-brakes were applied. It became evident that the train could not be stopped in time.

E. W. Landram, a brakeman, who was riding on the pilot of the locomotive, leaned as far forward as possible, and when the engine was about to strike the old man the brakeman gave him a terrific push, throwing his body to the side of the track, out of harm's way. Brakeman Landram was considerably shaken up and bruised, but the old man was unhurt. To-day this brakeman is the proud possessor of a bronze medal of honor. He is the latest hero to be honored by the Federal Government in this way.

Slipped on Ice; Fell Across Rail.

A woman passenger on a Burlington train at Burlington, Iowa, December 15, 1915, attempted to leave the train while it was in motion. She slipped on the ice and fell across the rail.

Walter Lynch, a flagman, saw her fall, made a dash across a patch of ice, risking his life, caught her and dragged her to safety, just an instant before the wheels were upon her. He, too, is now a medal wearer

Will Leggins, an employee in the shops of the Atlantic Coast Line Railroad, attempted to save the life of an engineman on that road at Thomasville, Georgia, on November 11, 1915. A locomotive was derailed and turned over on its side, pinning the engineman beneath the wreckage. Steam and hot water were scalding the unfortunate prisoner when Leggins climbed down inside the cab and extricated the poor fellow, who died that night. Leggins was not badly hurt.

W. A. Holley, a switchman employed by the Missouri, Kansas and Texas Railroad, on January 21, 1914, saved the life of a woman sixty-four years of age. Seeing her hesitate before a train approaching at six miles an hour the switchman ran to her, picked her up and carried her out of danger. The engine brushed him, but he was not badly hurt.

Raced in Front of Train.

Another hero on the same railroad is A. C. Werner, also a switchman on the Katy. The engine was pushing nine cars, at about fifteen miles an hour. Werner saw a small child on the track, about fourteen rail-lengths ahead. He jumped between the rails in front of the train, ran diagonally across the track, seized the child, and jumped to safety.

Miss Nettie Caskey, at the age of sixteen, saw a child three and a half years old playing on the track in front of a passenger-train. She ran and grabbed it up in her arms and then leaped aside, the two rolling down the side of an embankment locked in each other's arms. They were unhurt, and the engine missed them by a hair's breadth.

George Karsten, a switchman on the Chicago and Northwestern Railway, had an amazing experience in attempting to save the life of a woman on September 29, 1909. The woman tried to cross the tracks, seemingly unaware of the approach of a switch-engine.

Running to her, the switchman attempted to push her out of the way. She misunderstood his act and resisted him, actually fighting her rescuer. She continued to resist him until the engine struck them both.

The woman was so badly hurt that she died in a short time, but Karsten fell

SWITCHMAN MEDALIST

W. A. HOLLEY CARRIED AN AGED WOMAN BODILY OFF THE M., K. AND T. RIGHT-OF-WAY—SUFFERED SLIGHT HURTS.

between the rails, and the engine and tender passed over his body, badly scratching him and tearing his clothes. He was awarded a medal for his noble, if unsuccessful effort.

The pilot of an engine brushed Robert Brendle, a police officer of McKeesport, Pennsylvania, just as he was dragging from the rails a foreign-speaking woman who had failed to understand his warning cries as she stood in the center of the track, with a swiftly moving train bearing down upon her.

Threw Child to Safety.

Another instance of a thrilling rescue of a child occurred on the Chicago and Northwestern Railway on January 19, 1908, when Frank Larson, a fireman, seeing the little one on the track only four hundred feet ahead, climbed out on the pilot and threw the child to safety.

An unknown woman resisted the effort of Charles Bennett, a brakeman on the Chicago and Northwestern Railway, when he tried to push her to safety with a passenger-train bearing down rapidly. He just picked her up bodily and leaped, the two rolling down a fifteen-foot embankment, unhurt.

Station-Agent Edward A. McGrath, of the Chicago, Milwaukee and St. Paul Railway, at Stowell Station, Milwaukee, though a cripple, picked up a child from in front of a locomotive and saved her life, though the pilot beam struck him. He was not dangerously hurt.

One of his legs is about eight inches shorter than the other and he wears a wooden shoe, making it difficult for him to run rapidly.

DARED ICY RAILS

WALTER LYNCH, FLAGMAN, SAVED WOMAN WHO HAD SLIPPED ON ICE WHILE ATTEMPTING TO LEAVE MOVING TRAIN.

The lives of three men were saved by Charles Arms from a wreck on the Louisville and Nashville Railroad at Clarksville, Tennessee, on September 29, 1906. The locomotive, baggage, and mail-cars of a train had plunged through an open drawbridge into the Cumberland River. The baggage-man and two mail-clerks were in the cars, and though injured they managed to crawl to the top of the cars, which were not submerged.

The river was flooded and full of drift,

and the injured men were in immediate danger of being swept into the rushing water.

Though confined to a bed of sickness at his home near by, Arms heard the cries of the men. Summoning all of his strength he ran, half dressed, to the river-bank. It was dark. A number of other persons saw the peril of the three men, but none would risk going to them.

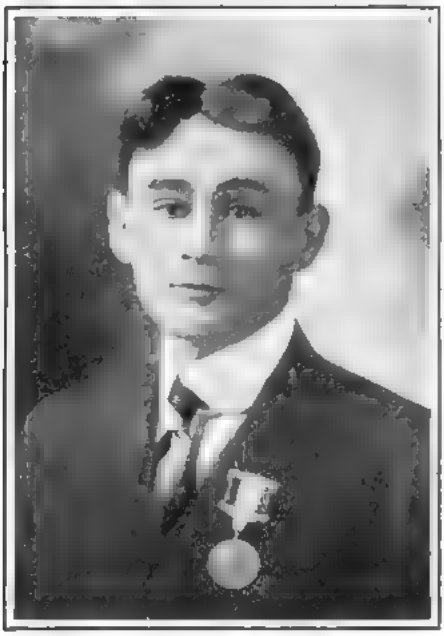
Arms secured a boat and, failing to induce any of the bystanders to help him, rowed out alone and took the three injured men from their dangerous position. The government has remembered him.

BOTH ARMS BROKEN, LOST A FOOT

GEORGE H. POELL SUSTAINED TERRIBLE INJURIES WHEN HE REACHED FROM THE PILOT OF HIS ENGINE TO PLUCK 12-YEAR-OLD BOY OUT OF HARM'S WAY—LAD WAS UNHURT

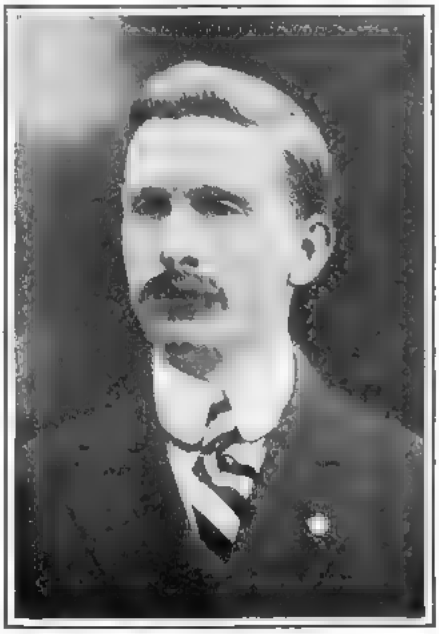
Joseph Corbett, a twelve-year-old, caught his foot in a frog of the Delaware and Hudson's main-line track at Parsons, Pennsylvania, and a passenger-train was bearing down on him when Edgar E. George heard his cries. Mr. George was a young stenographer employed by the Lehigh Valley Coal Company at Wilkes-Barre.

He could not extricate the foot in time, so he bore the boy's body down as far as the outer rail



SAVED A DEAF MAN.

OLD PEDESTRIAN ON TRACK COULDN'T HEAR BELL OR WHISTLE, SO E. W. LANDRAM CLIMBED OUT ONTO THE PILOT AND PUSHED HIM TO SAFETY.



DEFIED ONCOMING TRAIN

BOY'S FOOT WAS CAUGHT IN FROG; EDGAR E. GEORGE BORE CHILD'S BODY TO ONE SIDE—TRAIN SCRAPED THEM AS IT PASSED BY

From a photo by Bell, Wilkes-Barre

would permit and forced his leg under the cylinders, journal-boxes, and steps, which scraped their bodies as they came along. Both were injured, but not seriously.

Miss Mary Guinan, on her way home from work, saved the life of a man aged seventy-four on December 19, 1906. The old man had crossed before one train when he suddenly saw the approach of another and was so bewildered that he could not move. The young heroine ran to him and held him between the two tracks while trains whizzed past on either side. Neither was hurt

Edward Murray, a freight-conductor on the Pennsylvania Railroad, while riding on the footboard of the rear end of the tender as the engine was backing in switching operations, saw two little children only a few feet ahead.

He leaped from his position, lifted one child clear of the rails and grasped the other in his arms just in time to step on the footboard of the tender as it came up. No one was hurt.

Picked Up Children.

Charles W. Haight, an engineer on the Delaware, Lackawanna and Western Railroad, is another hero who won his medal by saving the life of a three-year-old girl on the track ahead of his swiftly moving engine by running out on the pilot and picking her up out of harm's way. He also received the Carnegie hero medal, as noted in the RAILROAD MAN'S MAGAZINE for September, 1916.

An almost exact duplicate of this act of heroism was performed by George H. Poell, a fireman on the St. Joseph and Grand Island Railway, June 26, 1905. The fireman, from the pilot of his engine, picked up a twelve-year-old boy, who escaped injury, though both of the arms of the rescuer were broken and his left foot had to be amputated.

George H. Williams, an engineer on the New York, New Haven and Hartford Railroad, on December 21, 1905, won his medal of honor by attempting to prevent a woman from crossing the track in front of a fast train at a railroad crossing near which Williams's engine was standing. The woman was not hurt, but Williams was struck by the engine, sustaining injuries which kept him from his regular duties for about three months.

Some Hold Carnegie Medals, Too.

Harry E. Duey, a brakeman on the Pennsylvania Railroad, saved the life of a three-year old child near Clarence, Pennsylvania, on July 13, 1915. His exploit, which was described on page 588 of the RAILROAD MAN'S MAGAZINE for December, 1916, also brought him a Congressional medal.

The reckless life-saving deeds of J. C. Frist, station-master at Meridian, Mississippi, and Patrick Mulligan, a crossing-watchman for the Pennsylvania Railroad, at Norristown, Pennsylvania, for which they were awarded Carnegie Hero medals as described in the RAILROAD MAN'S MAGAZINE for September, 1916, also resulted in their obtaining the coveted Federal decoration.

It is believed that there are many instances of such heroism that are not reported, because of the modesty of the heroes. Their friends should see to it that honor is given where honor belongs.

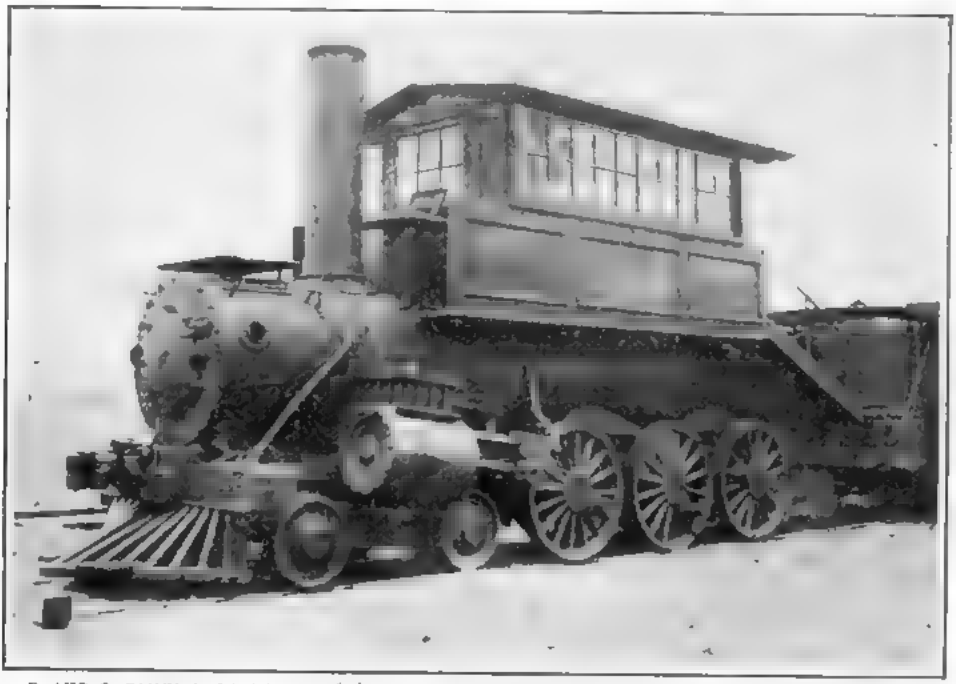
Applications should be addressed to the Interstate Commerce Commission, Washington, District of Columbia, with satisfactory affidavits of eye-witnesses.

THE OLD HEAD SAYS:

YOU DON'T REMOVE THE DANGER BY SMOTHERING THE RED LIGHT.

FROM THE RAILROAD MAN'S MAGAZINE

SEE THAT HUMP?



B. AND O. CAMEL BACK OF THE 60'S—THIS TYPE OF ENGINE GOT ITS NAME FROM THE FACT THAT THE CAB, SET OVER THE BOILER, RESEMBLED THE HUMP ON A CAMEL'S BACK

YOU would snicker if this crazy-looking engine should roll into your station to-day; but there was a time not so long ago, either—when railroad men's eyes bulged with admiration, instead of watering with mirth, at sight of the celebrated Baltimore and Ohio "camel-back," ugly as a horned toad to look at, but for years the most serviceable locomotive on American lines.

The notable Ross Winans, who started life as a New Jersey farmer boy and died with a record of some of the best railroad inventions of his day, conceived and built the camel-back engine.

It was this ingenious young man who likewise discovered that the right place for a wheel flange was on the inside of the rail, not the outside. He also put the journals outside instead of inside.

When steam locomotion came along Winans built numerous engines, but the most famous of his achievements was the camel-back. Under his supervision 119 locomotives of this type were constructed for the B. and O.

The inventor had the idea that an engine should be as heavy as the track would stand. He put the entire weight on four wheels originally, though later he distributed it, as is shown in the case of No. 173, a Hayes ten-wheeler of the 60's. The theory of the inventor was that every pound of tractive force in the machine was available for use when the weight was concentrated on the track.

The reason the engine looks so freakish is because of the observation tower built over the boiler. To the present generation this may appear like a greenhouse or a sun-parlor in the air, but in those days it was considered very serviceable to the engineer, who had to contend with the extremely sharp curves and heavy grades of the time.

One of these camel-back engines hauled a fifty-ton train over a temporary grade of 530 feet per mile.

IS MORSE TELEGRAPHY DOOMED TO EXTINCTION?

Brass-Pounders Everywhere Are Asking if the Rapid Growth of the New Automatic Printers Means Elimination of Manual Sending.

W. U. HAS 123 TRUNK-LINES PRINTERED.

Big Wire Company Handles About One Billion Five Hundred Million Words a Year by Means of the Mechanical Devices—Messages Can Be Sent by Typist and Received by Clerk, Whereas Morse System Requires Services of Two Skilled Operators.

BY ROGER FISON.

IS the old man of the clicking key and sounder the man who sends and receives your telegrams through the medium of lightning dots and dashes going to lose his job?

To-day finds thousands of American telegraphers anxiously asking themselves this question. A lusty and formidable competitor, known as the automatic printing telegraph in reality a machine for typewriting messages over a telegraph-wire has loomed up triumphantly at their side, and is now giving the Morse men the most strenuous race of their telegraphic careers.

Twice Capacity of Dot and-Dash Vehicle

The most prolific of the automatics handles eight telegrams simultaneously over one wire, whereas the dot and-dash vehicles at their best operation can carry but four messages simultaneously over one wire. Moreover, the automatics may be capably operated by non-telegraphers of from six to nine months' experience, scarcely one-sixth of the time required for the making of a skilled telegrapher.

Morse operators are viewing with deep concern the rapid installation of these speedy automatics throughout the country, for they see them capturing, and successfully holding, circuit after circuit always those carrying the most traffic in the realm of the dot and the dash. They feel that those long-used and (to them) almost human telegraphic implements, the clicking sounder and its flashing key, are soon to be supplanted by the tenfold more complicated, yet more easily manned automatic printing telegraph

Heretofore the automatics have been used more sparingly, and their activities have been confined mainly to commercial telegraph-offices.

To-day finds them not only pounding

briskly away on one hundred and twenty-three important trunk-lines of the Western Union Telegraph Company and ten circuits of the Postal Telegraph Company, but boldly entering the domains of the railroad telegrapher and the press telegrapher, which means that the man at the key must now hold his own against both the telephone and the automatic printing telegraph.

Can he do it?

Just how seriously does the invasion of the printing telegraph threaten the Morseman's position?

Is the Morse operator prepared for radical changes that may occur in the dot-and-dash field, and how may he best insure for himself steady telegraphic employment for the future?

Should Morseman Kiss His Job Good-By?

Will he who scoffs to-day at the possibilities of the printing telegraph eventually see all telegrams despatched through key-and-sounderless telegraph offices?

Ever since the invention of the Morse telegraph system in 1836, various automatic telegraph devices, claimed to be superior to the Morse method of hand-telegraphy, have been intermittently conceived and tried out on American telegraph-lines, and in each case it was generally predicted that the new apparatus would eventually supplant the Morse system.

Very few of these devices could meet the exacting requirements of the American telegraphic field for the simple reason that they were unable to despatch more efficiently or more economically a larger amount of traffic on existing wires than could be handled with the highly developed Morse methods.

Owing to the rapid expansion of the telegraph business in the United States during the past five years, however, telegraph companies, in order efficiently to handle the increasing traffic, have found it necessary either to continue building additional lines at enormous expense, else install mechanical apparatus that would greatly enlarge the capacity of the lines already built.

Merrily the Printers Thump-Thump.

The Multiplex and the Morkrum printing telegraphs, with transmission from typewriter keyboards and automatic reception in printed characters on telegraph blanks—the machines now so extensively employed throughout the country—seem to have met the exacting needs of the telegraph companies, and as a result are to-day thumping merrily away on scores of busy telegraph lines from the Atlantic to the Pacific.

Electrified keyboards flashing words to electrified typewriters!

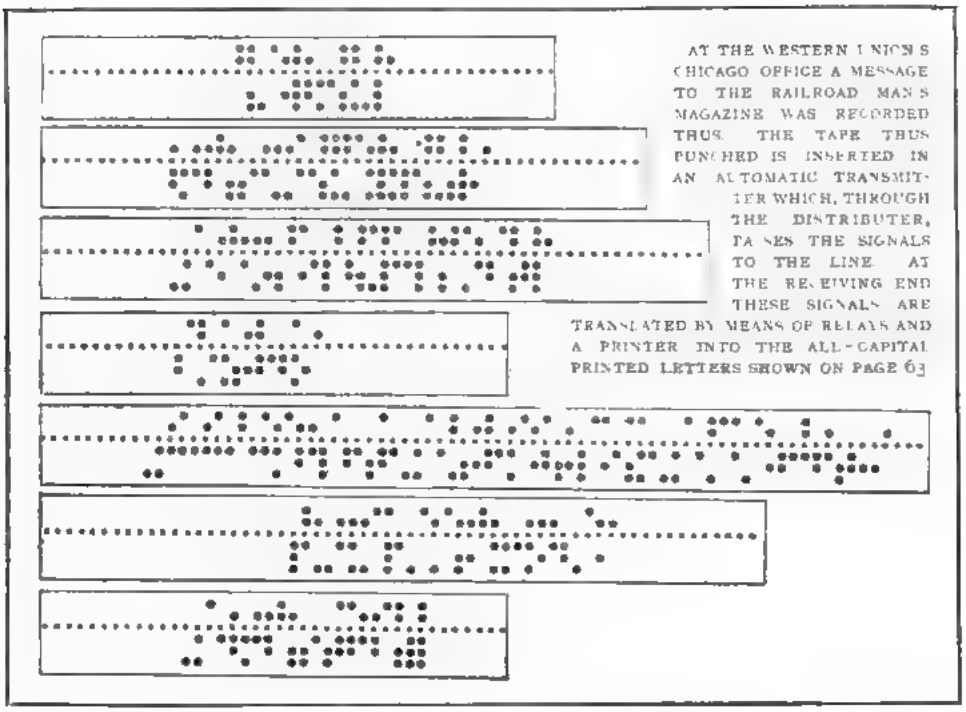
Efficiently to transmit a message over a Morse circuit, two skilled telegraphers are needed—one at each end of the line. The sender vibrates your message through a telegraph-key out over a wire in Morse signals, these signals being instantaneously reproduced on the sounder connecting the distant end of that wire.

The receiving operator at that end, who is familiar with the Morse language, catches the clicking dots and dashes, translates them into words, transfers the words to paper by means of a pen or a typewriter, and your message is ready for delivery.

Only Typist and Clerk Required.

To handle the same communication *via* automatic printing telegraph requires only a typist to send the message on the machine's transmitting keyboard, and a clerk to remove the message from its automatic printing mate at the distant end of the line.

Suppose the despatch is being wired from New York to Chicago. As the New York operator depresses certain letters or figures on her sending keyboard, those characters are transmitted to, and automatically typed, by the connecting printing unit at the Chicago end, this process continuing until the entire communication magically emerges at Chicago—all dressed up in ready-for-delivery clothing.



AT THE WESTERN UNION'S CHICAGO OFFICE A MESSAGE TO THE RAILROAD MAN'S MAGAZINE WAS RECORDED THUS. THE TAPE THUS PUNCHED IS INSERTED IN AN AUTOMATIC TRANSMITTER WHICH, THROUGH THE DISTRIBUTER, PASSES THE SIGNALS TO THE LINE. AT THE RECEIVING END THESE SIGNALS ARE TRANSLATED BY MEANS OF RELAYS AND A PRINTER INTO THE ALL-CAPITAL PRINTED LETTERS SHOWN ON PAGE 63

Automatic printing telegraph machines are to-day transmitting and receiving millions of words of telegraphic matter over lines of:

The Western Union Telegraph Company.

The Postal Telegraph Cable Company.

The Associated Press.

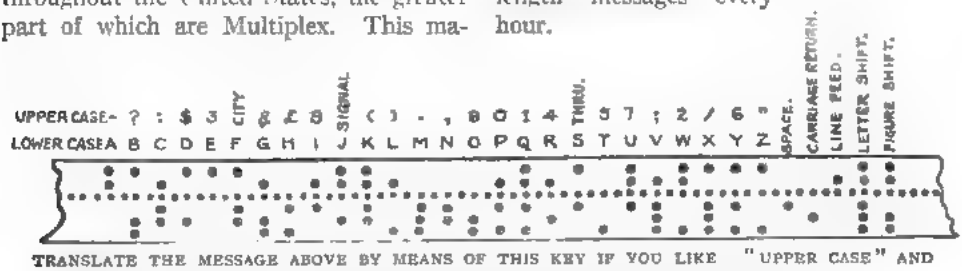
The United Press Associations.

The American Telegraph and Telephone Company.

Railroad systems in the United States and Canada.

The Western Union alone operates one hundred and twenty-three printer circuits throughout the United States, the greater part of which are Multiplex. This machine is the most prolific of all printing telegraphs. It handles eight telegrams at the same time—four distinct messages each way—over one wire.

Eight operators are required at each end of the line, however, four for "punching" or preparing the messages for transmission, and four for removing the received messages. The average speed of those machines used by the Western Union is regulated to operate at forty-five words a minute per channel—the four transmissions in each direction giving a total circuit output of 360 words a minute, or 720 average-length messages every hour.


UPPER CASE- ? : $ 3 CITY & £ 8 SIGNAL ( ) - , 9 0 1 4 THRU. 5 7 ; 2 / 6 "
LOWER CASE A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
SPACE.
CARRIAGE RETURN.
LINE FEED.
LETTER SHIFT.
FIGURE SHIFT.

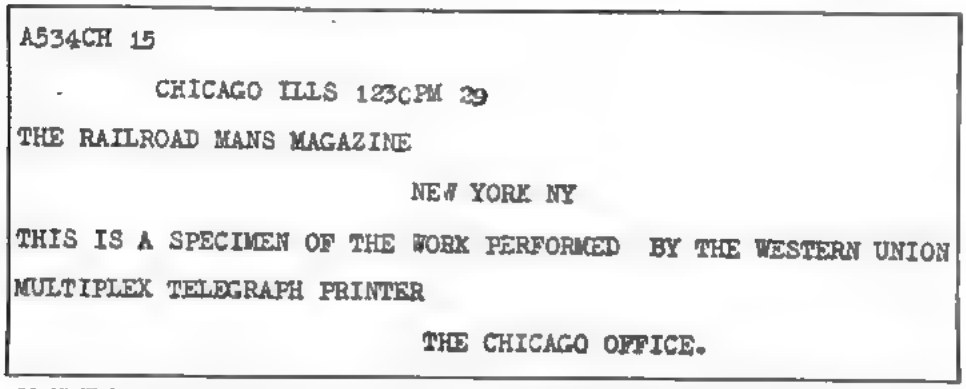
TRANSLATE THE MESSAGE ABOVE BY MEANS OF THIS KEY IF YOU LIKE "UPPER CASE" AND "LOWER CASE" IN THE LEGEND MEAN THE CHARACTERS RESPECTIVELY ABOVE AND BELOW THE DOTTED LINE RUNNING THROUGH THE MIDDLE OF THE TAPE

The general principle of the Multiplex involves the use of two synchronously rotating distributors, acting to connect to the line four automatic transmitters and printers at each station.

Outgoing messages are first prepared in perforated paper tapes. The tape thus punched is inserted in an automatic transmitter, which, through the distributor, transmits the signals to the line. On reaching the receiving end these signals are translated by means of relays and a printer into all-capital printed letters.

Its longest printer circuit operates between Chicago and San Francisco; its shortest between "C O" cable office, New York City, and The Associated Press bureau a few blocks away.

The Postal Telegraph-Cable Company, which uses only the Morkrum printer, has ten automatic circuits in operation in the United States, representing in all about two thousand miles of duplexed wire.



A534CH 15

CHICAGO ILLS 123CPM 29

THE RAILROAD MANS MAGAZINE

NEW YORK NY

THIS IS A SPECIMEN OF THE WORK PERFORMED BY THE WESTERN UNION MULTIPLEX TELEGRAPH PRINTER

THE CHICAGO OFFICE.

OR IF IT IS TOO MUCH TROUBLE TO WORK OUT THE MESSAGE ON THE OPPOSITE PAGE BY MEANS OF THE KEY SHOWN BENEATH IT, YOU CAN READ WHAT THE CHICAGO OPERATOR SENT, JUST AS IT CAME TO THE RECEIVING CLERK IN NEW YORK, ALL NEATLY TYPED OUT EACH STRIP CORRESPONDS TO A LINE IN THE TYPED MESSAGE

Receiving Perforator Aids Relaying

Where it is desired to relay messages, an apparatus known as a receiving perforator is attached to the printing unit so that a perforated record of the received message is obtained, thus automatically preparing it for retransmission on another printer circuit.

The Western Union installed its first Multiplex set on a New York-Boston circuit in the fall of 1913. During a period of eighteen months the wire carried a greater volume of message traffic than any other commercial telegraph circuit in the world

To-day the company handles approximately fifty million messages a year—one billion, five hundred million words through automatic printing telegraphs. This machine was first introduced on Postal lines in 1910.

The Morkrum handles two messages simultaneously over one wire. One type of this machine sends directly to the main line. The other type—the machine most widely used—transfers all outgoing messages to paper tapes before flashing them to the line.

Keyboard Device Prints in Capitals.

The transmitting apparatus on either machine is a keyboard device similar to a typewriter keyboard, and provided only with capital letters. On the direct-to-line Morkrum the sending operator simply writes all messages for transmission on the machine's keyboard, and in doing so operates certain mechanisms which send out combinations of electrical impulses to the line, these impulses in turn operating the receiving relays and printing outfit at the far end of the circuit

On the tape-transmitting Morkrum all messages for transmission are first reduced to perforated paper tape. This tape is automatically "punched" by the machine's transmitting mechanism which the sending operator sets in motion as he writes the outgoing messages on its typewriter keyboard.

The prepared tape is run through an automatic transmitter. The transmitter sends out combinations of electrical impulses over the wire to the distant or receiving end, these signals being translated by means of relays and a printer into Roman characters, thus preparing the messages for delivery.

It has taken many years of up-hill experimenting on the part of inventors and telegraph companies to bring automatic telegraphy up to its present high state of efficiency in this country. More than one machine has started out with every indication of brilliant prospects for the future, only to die a lingering death before it was half-grown.

Many Systems Used Paper Tapes.

The original Morse system consisted of reading the dots and dashes from paper tapes. The spaced letters were so liable to mixups, however, that sound-reading was finally adopted.

Prior to the expiration of the Morse patents in 1864, independent telegraph companies in America made excellent use of the Hughes and the House printing-telegraph systems—keyboard transmitters, received messages printed on paper strips. As soon as the independents could use Morse apparatus, the automatics were discarded.

In 1876 the House system was improved by a man named Phelps, and used on a New York-Chicago circuit at fifty five words a minute. It was soon abandoned

From 1879 until 1882 the American Rapid Telegraph Company used the Foote and Randall automatic system, but failed in competition with Morse lines.

Equally unsuccessful was the Leggo system, tried out on long lines of the Postal Telegraph Company in 1882.

P. B. Delany invented a synchronous system in 1883, and tried it on Western Union lines in 1885. It was finally taken to England, and was in service there twenty years.

In 1899 the Pollak-Virag tape-transmission system was brought here from Europe. It did not measure up to American requirements, but is still used in Europe, where the telegraphs are all operated by the government.

The Rowland octuplex printing system—direct keyboard transmission, prints directly in page form—was introduced in 1907 on Postal Telegraph Company lines, where it was used for two years.

The Wright printer—direct keyboard transmission, keys select polarity combinations which directly operate page printer at distant end was tried out by the Postal Telegraph Company from 1909 until 1912, then discontinued.

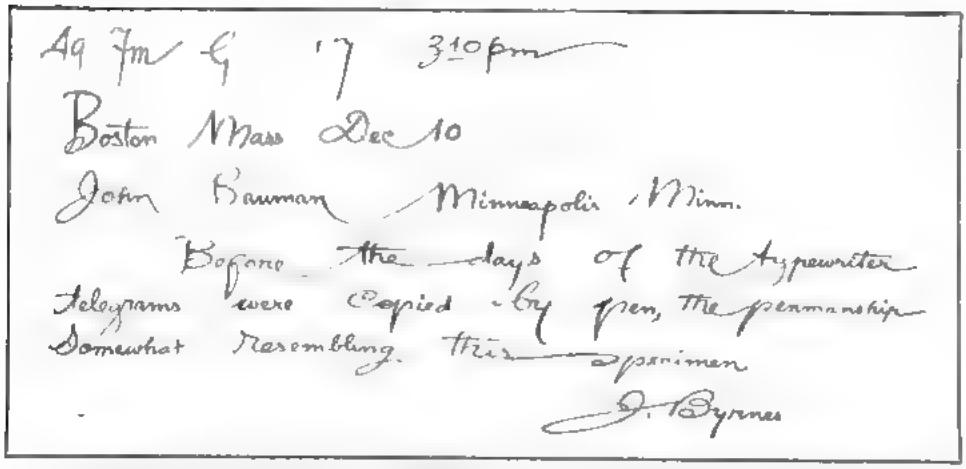
The Barclay printing system—tape perforated by keyboard, Wheatstone transmission, directly operated printer at distant end—was put to work on Western Union lines in 1907. Many installations were made. To-day finds most of the Barclays eliminated.

Millions Sunk in Printing Telegraphs.

The graveyard of the printing telegraph in America is of considerable dimensions, and untold millions have been squandered upon the unfortunate wrecks that lie therein. Yet the automatics now so successfully employed on American telegraph lines embody many of the most worthy features of those machines that limped feebly from the telegraphic field before the present ones came thumping into existence

And now let us observe some of these modern-day printers in rapid-fire action.

The most modernly equipped telegraph plant in the world—the general operating department of the Western Union Telegraph Company at 24 Walker Street, New York City—devotes almost an entire floor


Ag 7m G 17 310pm
Boston Mass Dec 10
John Bauman Minneapolis Minn.
Before the days of the typewriter
Telegrams were copied by pen, the penmanship
somewhat resembling this specimen
J. Byrnes

AN OPERATOR WHO COULD COPY 55 MESSAGES AN HOUR WITH PEN AND INK WAS A WONDER

to printing-telegraph operation. This floor is known as the automatic printing-telegraph department.

Instead of rapidly vibrating keys and furiously clicking sounders, one hears in these bustling quarters the ceaseless "thump — thump -- thump!" of madly pounding Multiplex and Morkrum printing apparatus, through which an endless tide of Western Union message traffic is constantly speeding to and from distant cities.

"N. Y." Uses 27 Printing Circuits.

Linked with this department are four printing circuits to Chicago; two each to Boston, Philadelphia, and Albany; and one each to Newark, New Jersey; Baltimore, Washington, Richmond, Atlanta, Kansas City, St. Louis, Indianapolis, Cincinnati, Cleveland, Detroit, Buffalo, Pittsburgh, Rochester, Syracuse, Montreal, and Toronto—twenty-seven of the Western Union's most important trunk-lines in North America.

Morse telegraph sets—to be used for overflow business or in case a printer goes out of commission—are wedged in here and there.

The printer units rest on long, narrow operating-tables, where sit scores of busy girls, some transmitting messages through the machines' typewriter keyboards, others removing received messages from the printing sections of the machines. Flashing incandescent signal-lights visible through glass panels, whirring electric motors, rolls of telegraph blanks being rapidly consumed by magically dancing type-wheels, sharp mechanicians doctoring indisposed printer units, or else supplying them with new hearts—this amazing scene of activity confronts the astonished visitor in the automatic-telegraph department.

Swiftly moving carriers overhead are shooting in a never-ending stream of despatches for printer transmission, while check-boys and check-girls, gliding over the floor on roller-skates, are hastily distributing them to printer positions.

As fast as messages emerge from the prolific printers they are snatched up by nimble-fingered girl clerks, who, after carefully reading and stamping them, fling them on to wide carrier-belts that glide noiselessly but rapidly across the center of each operating-table, these belts conveying the received messages to distributing terminals on the floor below.

The "punchers"—those manipulating the keyboard portion of the machines' sending apparatus—transfer the contents of all outgoing messages into paper tape for transmission, this tape serving as an accurate record of each forwarded message. Every communication is carefully read while in the course of transmission,

NA 716 M 14 9:46 p.m.

Los Angeles, Calif. Dec.16-16.

Mr. James Dunsheath,

Pittsburg, Penna.

This telegram handled by Morse telegraph and copied from the sounder by ordinary typewriter.

Hugh Stewart.

LOTS OF EXPERT MORSEMEN CAN TAKE 60-ODD MESSAGES AN HOUR "ON THE MILL," WITH FAR LESS STRAIN THAN WAS CAUSED BY THE USE OF THE QUILL

and, as a constant reminder to operators, big clocks, scattered conspicuously over the walls, boldly display this significant admonition—ACCURACY FIRST!

Operators Receive 6 Months' Schooling.

Most of the clerks who send and receive messages *via* "N Y's" printing telegraphs are trained in the Western Union printer school, two floors above the automatic department. After completing a six-months' apprenticeship in geography, spelling, copy-reading, and the touch system of typewriting, the student is generally a competent printer clerk.

"N Y" office has three hundred and fifty printer employees. Approximately two million messages a month, or thirty-eight per cent of its entire monthly traffic, is despatched by the automatics.

In the former office at 195 Broadway considerably less printing apparatus was used, and only 700 Morse operators were employed. The present plant, notwithstanding its twenty-seven printer circuits, employs 1,000 telegraphers. The automatics have, however, captured the busier and more important lines, relegating Mr. Morseman to wires of less import.

In the big Western Union office at Chicago, thirty-five per cent of the business is handled *via* the printers, the other sixty-five per cent representing Morse operation.

1 AG W 9

CAIRO ILL DEC 10 16

JOHN JONES

BOSTON MASS.

THIS MESSAGE RECEIVED BY THE MORKRUM PRINTER TELEGRAPH SYSTEM.

WILLIAM SMITH

2 A.M.

MANY SKILLED OPERATORS CAN EASILY PUNCH 100 MESSAGES AN HOUR ON THE MORKRUM PRINTING-TELEGRAPH KEYBOARD

From varied opinions obtainable on the subject, the advantages and disadvantages of the printing telegraph as compared with the Morse hand method, are:

Advantages Claimed for Printer:

Greatly increases the capacity of a wire.

Lower cost per message in handling. Can be operated by non-telegrapher who receives from $12 to $16 a week.

Under normal conditions, greater volume of business per operator per hour can be handled.

In case of temporary line failure, messages can be "punched" in tapes, during the time the line is out, and when the circuit is restored, be transmitted with greater rapidity than is possible by Morse.

The printer is always ready for duty. It never complains of being overworked, and will not go on strike.

Disadvantages Urged:

Very bulky. A printer outfit weighs fully seventy-five per cent more than a Morse set.

More expensive than Morse apparatus. A terminal quadruple Multiplex set costs in the neighborhood of $4,000.

More intricate in construction, and owing to heavy maintenance expense, its use is justified only on lines linking points between which a large flow of business is exchanged. (The eight-channel Multiplex requires eight printing clerks, one printer supervisor, and one mechanician or printer attendant at each end of the circuit.)

The printer is more noisy in operation than the Morse.

It must be watched constantly, lest letters stick or miss.

Will not work when wires are swinging. At such times Morse apparatus will often work.

Necessitates providing a current supply for printer local circuits at a potential other than that readily obtained from ordinary telegraph generator plants.

Accurate figures and facts regarding the speediness of the printing telegraph are hard to obtain, the number of messages handled per hour by the printer depending entirely on the type of machine used, the skill of the sending operator, condition and length of line, and the character of the messages transmitted.

On December 1, 1913, on a Morkrum circuit between Chicago and Milwaukee, from 8 A.M to 5 P.M., there were handled 2,059 messages both ways, or an average of 114 messages an hour from each end.

She "Punched" 178 Messages An Hour.

General sending and receiving averages on the Morkrum and the Multiplex machines range all the way from forty to one hundred messages an hour; in special cases, far above that. The highest average on record is that of Miss Lilian Wagenhauser, an operator in New York City Western Union office, who "punched" 178 messages in one hour on a Morkrum.

On the other hand, expert Morse operators in the large offices of the two commercial companies are to-day handling by the month an average of from 63 to 64 messages an hour. A Morse record of 101 messages an hour was recently maintained during an entire working day on a New York-Chicago Western Union duplex circuit. A. J. McGivern and H. F. Tyler handled the "N Y" end; J. L. Tipton and B. L. Wilson the Chicago end.

Never in the history of the telegraph has Morse operation been speedier!

It must be remembered, however, that, under favorable conditions, the eight-channel Multiplex printer used by the Western Union gives one circuit an average output of 360 words a minute—45 words a minute to each transmission. A Morse quadruplex set, representing four transmissions simultaneously over one

wire the top-notch capacity of any Morse circuit—even if manned by the most expert telegraphers, could not total 360 words a minute.

If Morse operation *were* capable of giving eight transmissions simultaneously over one wire, the telegrapher would have but little difficulty in competing with the eight-legged automatics

Not only in commercial telegraph offices, but also in the news-gathering field and along the great steel highways are the clicking key and sounder beginning to make way for the thumping automatics

MISS MARGARET ROWE, THE BEST "PUNCHER" IN THE MULTIPLEX "SET" SHOWN BELOW

Railroads that have adopted printing telegraphs claim that the machines are a good substitute for Morse on "heavy" circuits, in that they are faster and more efficient that they make for increased wire facilities and for a reduction in the cost of labor.

The following rail-

NEW YORK END OF THE NEW YORK TO BOSTON MULTIPLEX CIRCUIT. THE GIRLS ARE PREPARING THE OUTGOING MESSAGES, THE RESULT OF THEIR LABORS APPEARING IN THE FORM OF THE PERFORATED PAPER TAPES SHOWN ON PAGE 62

roads are now employing printing telegraphs:

Canadian Pacific—Morkrums on eastern and western trunk lines.

Southern Pacific—several Morkrum circuits.

Chicago, Rock Island and Pacific—three Morkrum circuits.

Chicago, Burlington and Quincy—Morkrums on two circuits.

Lake Shore and Michigan Southern Morkrum between Toledo and Cleveland.

New York Central Morkrum between New York and Albany; American Telegraph Typewriter printer between New York and Buffalo.

Pennsylvania System—Union Switch and Signal Company printer (Wright) between Philadelphia and Pittsburgh.

Delaware, Lackawanna and Western—American Telegraph Typewriter printers between Scranton and New York City.

How do various railroad telegraph officials view the invasion of the automatic printing telegraph in the American dot-and-dash field?

A. B. Taylor, superintendent of telegraph of the New York Central Lines, believes that the telephone is the real competitor of the telegrapher.

Calls Phone the Telegraph's Rival.

"As I look at it," says Mr. Taylor, "the telephone has, thus far, displaced the Morse, and is likely to in the future to a much greater degree than the printing telegraph. As perhaps you know, the railroads generally over the United States are now despatching trains largely by telephone."

This from a Chicago, Burlington and Quincy Railroad official

"We have found that our printers have best served us in speeding up the service and in meeting the requirements on circuits which were, when worked in the Morse, so crowded that relief could be obtained only by the construction of another circuit between the congested terminals.

"It has not seemed that the installation of a printer circuit could be justified when a Morse circuit still possessed some surplus capacity over the immediate volume of business it might be handling."

E. L. King, superintendent of telegraph of the Southern Pacific Company, declares:

"We work Morkrum printers satisfactorily over trunk-lines. They will never, to my mind, replace the telegraph for local or way-wire work. I believe, however, that the Morkrum or Multiplex will be necessary to handle expeditiously the present-day 'long-haul' telegraph business, commercial or railroad, rather than requiring construction of additional wires for Morse."

W. F. Williams, superintendent of telegraph of the Seaboard Air Line Railway Company, Norfolk, Virginia, says:

Doesn't Think Morse Will Be Superseded.

"The Seaboard experimented with the American Telegraph Typewriter. Our conditions were not favorable for high speed, having only an iron wire to experiment on. We operated them between Norfolk, Virginia, and Jacksonville, Florida, duplexed at a speed of twenty words per minute direct from keyboard. Our Morse exceeded this speed.

"There is a place for printers in the railroad telegraph service where a speed of fifty to sixty words per minute is attainable and the volume of business justifies it. I do not believe these will supersede the clicking Morse, but, like all efficiency inventions, a place is made for them.

"The volume of business over railroad wires is increasing all the time, and the tendency is to handle much that now goes by mail by telegraph, especially to those points at long range."

Mr. L. B. Foley, superintendent of telegraph, telephone, and wireless of the Delaware, Lackawanna and Western Railroad Company, says:

"We are using the telegraph typewriter transmitting machines of the American Telegraph Typewriter Company on a sim-

plex telephone circuit between New York and Scranton, where the largest volume of our telegraph business is handled.

" These machines have given good satisfaction, and result in reducing the cost of handling telegrams very materially for the reason that they can be operated by any person familiar with a typewriting machine, and the services of a receiving operator are dispensed with, as the messages on the receiving end can be removed by any one in the office, after being recorded on the message blanks.

" There is, however, plenty of work for the Knights of the Key. Telegraph operators are receiving higher wages to-day than ever before in the history of the art."

MISS LILIAN WAGENHAUSER, HOLDER OF THE WORLD'S HIGHEST AVERAGE RECORD FOR SENDING BY AUTOMATIC PRINTER TELEGRAPH. SHE DESPATCHED 178 MESSAGES IN ONE HOUR ON A MORKRUM

Morkrum tape printers are successfully employed in the Eastern division of the

Associated Press in distributing daily news from its New York City headquarters—"A P" office—to newspapers in New York City and Newark, New Jersey, and from its Pittsburgh bureau to Pittsburgh papers. A Morkrum circuit also operates between "A P" office and "C O" Western Union cable office (a few blocks distant), over which is despatched a large portion of the huge volume of cable news used by the Associated Press. A one-channel, short-line Western Electric printer is being experimented with from "A P" office to a newspaper in Paterson, New Jersey. Sending averages of from 55 to 60 words a minute are regularly maintained on these circuits.

The first-mentioned group—the New York City lines—operates two circuits to each newspaper both day and night, ten papers being served by the printers during the day and nine at night. Two operators at "A P" send the news from keyboard transmitters simultaneously to the whole group of printing receivers in the various newspaper offices, giving each newspaper a daily average of from 30,000 to 35,000 words of report.

A record copy of all "sent" news is automatically typed by the machines at the sending station simultaneously with that printed at the receiving ends, thus making it possible for any error in transmission to be quickly detected and corrected.

Receiving Station Can Talk to Sender.

The news at each receiving station is automatically typed on rolls of smooth white paper eight inches in width, and as each item emerges from the printer it is removed by an attendant, who carries it to the telegraph editor. If for any cause the receiving apparatus goes out of commission, the attendant simply throws a switch which cuts the interrupted circuit onto an emergency set.

If the receiving station wishes to talk with the sending station, the attendant presses a button which lights a lamp and rings a buzzer at the latter point. That particular wire is then switched to the proper instrument, after which a conversation may be carried on with this one station with no interference to the operation of the others.

The United Press Associations maintain a printing circuit from their New York City bureau to two New York newspapers, one paper in Newark, New Jersey, one in Jersey City, New Jersey, and one in Hoboken, New Jersey.

Lots of Jobs for Displaced Operators.

Although the installation of printing telegraphs by the Associated Press and the United Press Associations displaced a score of expert telegraphers at the points heretofore mentioned, all were given employment elsewhere

One of these displaced Morsemen characteristically describes the introduction of the printer in a certain newspaper plant where the clicking sounder had previously held full sway:

"They installed the automatic near my Morse telegraph instruments," declares this Knight of the Key. "Suddenly I heard a racket that I'd never heard before –my bulky opponent had begun to pound out copy. The race was on!

"The steady 'thump — thump — thump!' of the printer soon began to mix itself up with my clicking Morse signals, and I had to amplify the dot-and-dash sound by cutting in an extra sounder.

"Swift as were the signals from the Morse wire, however, and accurate though my typewriter work, my copy was not more perfect nor turned out faster than that emerging from the automatic printing telegraph.

"I had thought the printers wouldn't work. Well, *this* one worked all right—worked like some efficient mechanical Satan. It delivered yard after yard of clean printed copy in a jerky, steam-roller voice—a voice that could, however, automatically and without fatigue, forever announce the typewritten words on an endless roll of smooth white paper."

Even the largest telephone company finds the printing telegraph useful. The plant department of the American Telegraph and Telephone Company in New York City maintains a Western Electric printing circuit for its message traffic between New York and Chicago.

And now comes a most interesting phase of this automatic printer invasion. In spite of the rapid growth of printing-telegraph operation on thousands of miles of telegraph circuits throughout the country, Morse operators are at present, and have been for the past two years, in greater demand than ever before.

The call for first-class telegraphers has even exceeded the supply. In scores of "waiting" list rooms in big telegraph offices throughout the country the "Anybody-waiting?" signal, flashed daily from operating-rooms in dots and dashes, has frequently been met with the reply, "Nobody here." Extra men have been as scarce as hens' teeth.

The same problem has existed on many railroads. Mr. J. C. Johnson, superintendent of telegraph of the Pennsylvania System, said to the RAILROAD MAN'S MAGAZINE on December 19, 1916:

"Our demand for first class operators now exceeds the supply."

30 Per Cent Traffic Increase in 5 Years.

This condition may be partially accounted for by the thirty per cent increase in telegraph traffic in the United States during the past five years, by the phenomenal growth of the brokerage business, which has created hundreds of lucrative positions for expert telegraphers, and by the growing demand in all lines of work for young men.

Both of the commercial telegraph companies have been so short of Morsemen that they have established telegraph schools in numerous cities, where they are encouraging young folks to take up the study of dot-and-dash manipulation

That the innovation of the night-letter and day-letter service by telegraph companies has played an active part in the increase of their business is shown by the following newspaper clipping:

> NEW YORK, Oct. 2.—An example of the pressure put upon the telegraph companies by the recent activity in the New York Stock Market is the sending of 12,000 telegrams by a member of the Curb Exchange in the form of night letters to all parts of the United States. The telegrams, filed with the two big telegraph companies Saturday night, are said to have constituted one of the largest single telegraph orders ever sent from this city. The cost is estimated at $6,000

Because of its two winning features—speed and attention-compelling power—innumerable business concerns are making almost unlimited use of the telegraph.

Dunning Letters by Wire.

The peculiar magic of the telegram's attention-compelling power is proving particularly effective in the collection of rusty accounts. It has solved the problem for many large business houses in dealing with the "slow-pay" or "no-pay" customer. They pick out the worst delinquents and send each a telegram.

Out of twenty-nine "dunning" night-letters sent to delinquents by a hardware firm on the Pacific coast, the "punch" of the telegraph was so effective that twenty-one remitted in full.

A traffic department official of the Western Union Telegraph Company said to the RAILROAD MAN'S MAGAZINE:

"To-day the W. U. is selling telegrams. Our sales-department men call on business people who are intending to mail letters to prospective customers and suggest that a certain form of telegram be sent to each prospect in lieu of a letter.

"One of our solicitors in Wall Street recently sold 138,000 words of telegrams of this nature, while a certain Philadelphia solicitor sold a Philadelphia department store 33,000 night-letters which were sent simultaneously to its customers, calling their attention to a special sale.

"Our argument is that as an attractor of attention the telegram is 100 per cent efficient. It gets an immediate interview,

while the circular letter often goes to the waste-basket.

"Cardinal Gibbons recently sent out 109,000 night-letters to individuals asking for contributions of $1 each for a certain Catholic school. The result was a quick response of thousands of letters — with remittances

J. L. TIPTON (LEFT) AND B. L. WILSON, CHICAGO END OF A MORSE-DUPLEX TEAM WHICH RECENTLY ESTABLISHED A NEW RECORD ON THE NEW YORK WIRE

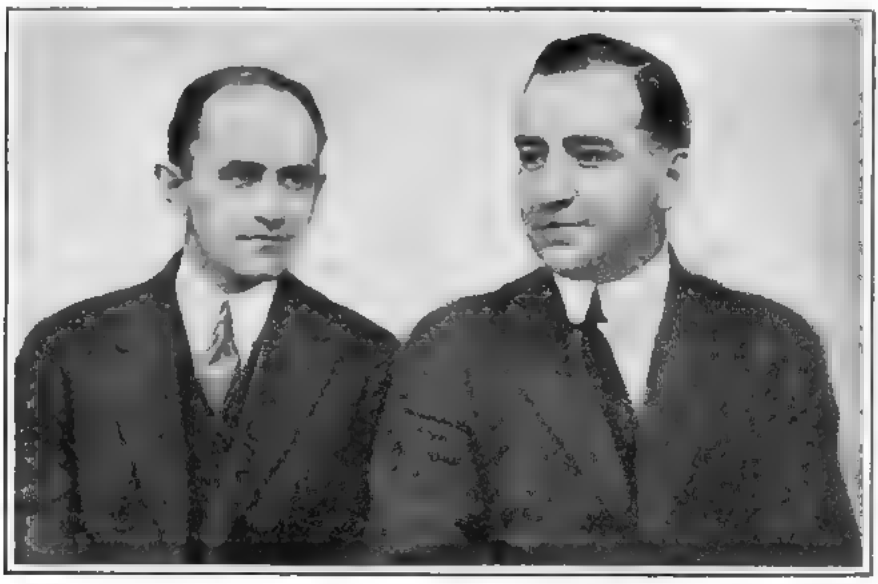
"A menagerie man had a band of elephants which he wished to sell. He night-lettered everybody in the United States who he thought might be in the market for elephants. So great was the response that he could not fill all the orders.

"Probably the most unique sale we have made is that reported by our manager at Lawton, Oklahoma. He was requested by a furniture dealer and a hardware dealer to watch for marriage licenses and send congratulatory telegrams from each firm to the contracting parties, inviting them to call and receive a wedding present awaiting them at each store.

"Telegraph service to-day is becoming second in importance to the post-office itself, and the need for additional facilities for handling it promptly and accurately has simply demanded the introduction of machine telegraphy on many of our heavy circuits."

"Are the printers gradually supplanting the Morseman?"

This question was put to H. A. Emmons, operating practice engineer of the



H. F. TYLER (LEFT) AND A. J. McGIVERN, EASTERN MEMBERS OF THE RECORD-BREAKING MORSE DUPLEX TEAM. THESE OPERATORS, IN COOPERATION WITH THE TWO SHOWN ABOVE, MAINTAINED A LEVEL OF 101 MESSAGES AN HOUR THROUGHOUT THE ENTIRE WORKING DAY

Western Union Telegraph Company, by a representative of the RAILROAD MAN'S MAGAZINE. His reply follows:

"Wherever we install automatic printers, business at those points increases so rapidly that we need just as many Morsemen as were used before the installation. People are sending more telegrams to-day than ever before.

"They realize that they can get quick, accurate service, and they are taking advantage of it. The confidence of the public in the telegraph has been greatly strengthened during the past few years.

"The automatics had to come. Affairs reached a stage where our lines were carrying all the traffic they could carry with the Morse hand operation.

"Either more lines *had* to be built, or else the capacity of the existing wires increased. We adopted the Multiplex printing system, which practically quadruples the capacity of any trunk-line.

"One hundred and twenty-three of our heaviest circuits throughout the United States are now printered, and others will be manned with the automatics as soon as the machines can be made and delivered.

"A wider use of the automatics is surely coming—on press, railroad, and commercial wires. The evolution will be so gradual, however, that I do not think the Knights of the Key have any reason to give it immediate concern."

McNicol Sees Bright Future for Student.

Mr. Donald McNicol, of the engineering staff of the Postal Telegraph-Cable Company of New York City, gives this wholesome bit of advice to Morse operators who desire advancement and who would insure telegraphic employment for themselves should the key and sounder become less extensively employed in the future:

"Every railroad and commercial telegrapher who wishes to advance in the service should study the operation of Morse duplexes and quadruplexes, as a working knowledge of these systems is essential to an understanding of printing operation. The introduction of automatic printers in big telegraph offices throughout the country, the circuits of which require expert supervision at main switchboards and repeater stations, has created a large number of positions which are more remunerative than working a key.

"Having a correct knowledge of the operation of the Morse duplex and quadruplex, one can quickly learn the theoretical operation of the printers.

"A Morse man makes the best kind of printer man because he can correctly read copy, generally understands circuits, and is also available at any time for Morse work."

Unlimited Opportunity for Learners.

Unlimited opportunity seems to prevail just now for telegraph operators who will take up and master printing telegraph operation. A. J. Reader, an expert W. U. telegrapher in New York City, who stepped from the Morse room into the automatic department as printer attendant, and who has been with the printing telegraphs for nine years, has this comment to make:

"Any competent Morse man of a mechanical turn of mind, who takes an interest in the construction and care of telegraphic equipment, can, if he will, qualify for and obtain employment as printer attendant—the man who doctors the automatics—in the automatic departments of the big telegraph companies.

"The applicant must, of course, be mechanically inclined, at least an elementary electrician, and a first-class Morse man. Such jobs pay from $25 to $35 a week, and the work is far more interesting than pounding brass."

Of some forty or fifty prominent telegraph officials and telegraph engineers interviewed by the RAILROAD MAN'S MAGAZINE, nearly all declared that the key-and-sounder methods of telegraphy may be somewhat reduced by printing-telegraph operation in the future, but that the Morse instruments would always be used

SECTIONAL VIEW OF ST LOUIS MULTIPLEX SET "MUX" TO CHICAGO IS ON THE RIGHT CENTER, TO KANSAS CITY ON THE LEFT CENTER, TO NEW YORK ON THE EXTREME RIGHT AND LEFT

in cases where quick cut-in service at remote points is desired, on local and way wires, for wire-testing at telegraph switchboards, for overflow business on heavy printer circuits, and on circuits with many drops, where, for instance, one man sends simultaneously to a number of far-away points.

There are times, too, when the printers temporarily fail, and during such emergencies the telegraph companies rely on Morse outlets to take up the burden.

Key and Sounder Easily Transported.

The Morse key and sounder has a peculiar field of its own. You can easily lug the instruments about—on the battle field, in the wilderness, anywhere. A printing telegraph outfit is not so easily transported

Some may argue, "Why not use telephones in all the foregoing instances?"

Morse operation requires but one wire and a ground return, whereas telephone circuits for satisfactory operation over distances beyond fifty miles, require an all-metallic circuit two wires. That extra wire represents a big cost in copper or iron and in maintenance expense

The following comment from the manager of the largest railroad telegraph system in the world the Canadian Pacific should bring cheer to every Morse operator in the land

"The Morkrum Printing System of Telegraph is being used successfully on both Eastern and Western trunk-lines of the Canadian Pacific. While the printing telegraph has greatly developed, and is giving a measure of almost perfect service, I do not expect it to supersede the dot-and-dash method of Morse telegraphy.

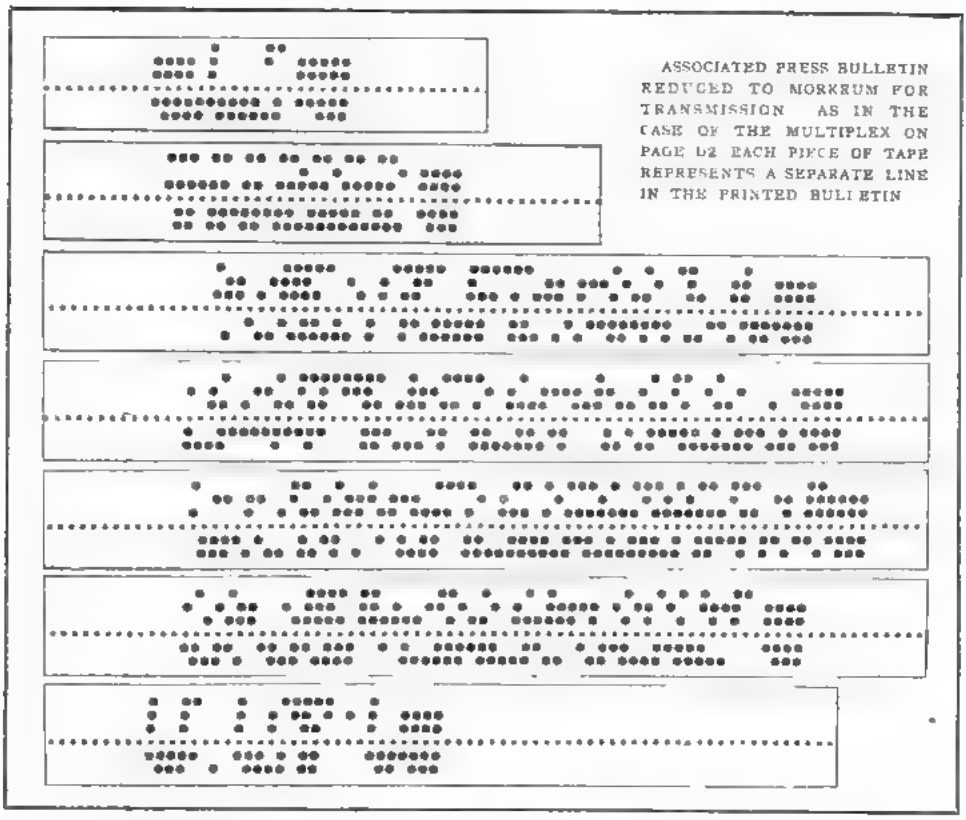
"I am given to understand that the Western Union have never used as many printers as they use to-day, nor have they at any time in their history employed as many Morse telegraphers as they do to-day. I do not expect any shortening of the demand for Morse telegraphers.

"It is quite true that between central points the printer is capable of moving heavy traffic. At the same time, the Morse telegrapher has a field that I do not expect the printer to seriously interfere with. Professor Morse gave us a method of communication that has stood the test of years, and is likely to remain, so that there is yet an immense field for men and women who wish to follow telegraphy."

Don't Fret Over Readjustments Mr. Opr!

Walter P. Phillips, inventor of Phillips's Code, the use of which has saved telegraph companies hundreds of thousands of dollars, a man who for half a century has kept his finger on the pulse of matters telegraphic, also believes that the printers will have no detrimental effect on Morse telegraphy. Mr. Phillips sends this significant message to Morse telegraphers through the RAILROAD MAN'S MAGAZINE

"The introduction of the Multiplex system, even on a large scale, will not hurt



ASSOCIATED PRESS BULLETIN REDUCED TO MORKRUM FOR TRANSMISSION AS IN THE CASE OF THE MULTIPLEX ON PAGE 62 EACH PIECE OF TAPE REPRESENTS A SEPARATE LINE IN THE PRINTED BULLETIN

the Morse men, I am quite sure. The telegraph business has become so large that some means of handling it in bulk is a necessity. I think that press associations and broker firms will always give employment to first-class telegraphers

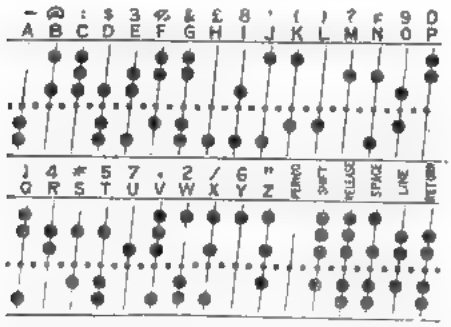
"You should never get excited about readjustments. Nothing has grown more like wild-fire than the linotype, yet more type for hand-composition is sold than ever before; and what with typesetting by hand and hitting up the 'lino,' the good compositor was never in such demand or as well paid as he is to-day.

"*Intelligence, energy,* and *industry*—these, my brothers, constitute the pole that brings down the persimmons.

"Operators should go on the theory that the world is their oyster. There are a thousand things an intelligent man can do.

"Telegraphy should be merely a sort of preparatory school for young men. The opportunities presented while they work at the key are sufficiently great that, if grasped, will enable them to enter almost any profession they may choose."

Considering the vastness of the American telegraphic field—hundreds of thousands of miles of commercial, railroad, press, brokerage, and privately owned



AGAIN YOU HAVE THE CHANCE TO WORK OUT THE MEANING OF THE PUNCHES, THIS TIME WITH THE AID OF THE MORKRUM CODE-KEY

A---- 12.

B U L L E T I N.

BERLIN, JANUARY 12--- BY WIRELESS TO SAYVILLE ---

THE LOSS OF 600 LIVES BY THE DESTRUCTION OF AN ITALIAN

BATTLESHIP IS REPORTED BY THE A N Z E I G E R OF BASEL,

SWITZERLAND, ACCORDING TO THE OVERSEAS NEWS AGENCY.

--K.H.--320P.M.--

TOO LANGUID TO DOPE OUT THE PUNCHED MESSAGE OPPOSITE WITH THE AID OF THE LITTLE KEY? OH, WELL, THEN READ IT JUST AS IT THUMPED ITS WAY INTO THE "A. P." OFFICES

lines and especially in view of the splendid Morse performances on certain lengthy press and brokerage circuits, some of which are five thousand miles in length, it is hard to believe that automatic telegraphy can, or ever will, entirely supplant the good old key and sounder.

Entirely eliminate the key and sounder from the telegraphic field, and much of the sentiment connected therewith will have vanished at least for those telegraphers who have long been identified with its cheering dot-and-dash chatter.

For these it possesses romance and attributes almost human. To them it has meant far more than merely a speedy vehicle with which to create and mystically flash dot and-dash signals.

They have understood and have been deeply thrilled by its magic voice. It has stirred their imaginations.

There are those who have listened to its message of cheer, its tale of sorrow, or its bright, snappy laugh in some humble shack or dingy box-car at the side of a towering peak in the Rockies, on the arid plains of Wyoming, Texas, or Arizona—up in the vast lumbering regions of the far North.

These especially grew to love its pulsating dot-and-dash music. Its ceaseless clicking kept them in touch with the active and more populated sections of the world.

It vividly set forth in simple Morse talk events that were occurring miles and miles away, portraying at the same time many of the strange characteristics of those who, through its key, flashed the quivering impulses out over connecting strands of electrified copper or iron.

In the weary hours of the solemn night it safely guided speeding trains through dark, dreary stretches of mountain, valley, or plain. It ordered food, fuel, cloth ing, or doctor -sometimes soldiers—from miles and miles away.

Its master, the Morse telegrapher, but tapped it gently and it spoke spoke obediently and in lightning fashion to other minds far, far away. No complicated mechanical apparatus this –only a flashing key, a shouting sounder, and a live spark of electricity!

Is Morse telegraphy doomed?

"The Morse system," says the *Telegraph and Telephone Age*, "is the Gibraltar of the telegraph, and the Morse operator will always be with us."

"Thump!—Thump! Thump!" pound the indefatigable automatic printing telegraphs.

Get acquainted with them, Mr. Morseman!

OBJECT: MATTER O' MONEY.

BY EMMET F. HARTE.

Trainman Larry O'Leary's Search for the Girl of the Golden Aura Has an Unexpected Ending.

THERE are those within a day's journey by limited train who would fain have you believe that luck is a myth; that horseshoes, four-leaved clovers, and black cats are barren of efficacy; that even to wish on a shooting-star is folly and absurdity, suited only to the idle make-believe of children and shallow-pates.

Don't listen to such talk, I prithee. He who foolhardily denies the potency of Fortuna, must needs repudiate Cupid, too; and Santa Claus; and likewise all the fairies that dance upon the moonlit greensward of summer nights; and—and— But fortunately a lot of us know better.

We know that luck is a mighty factor in the affairs of men — and maids, too. Who is there among us that isn't secretly longing for the favorable break we know we deserve, and expect- -sooner or later? Who, indeed? And here's hoping!

Larry O'Leary was the good-looking young brakeman on the Cottontail Flyer. His run was between Hotchkiss and Grand Valley. You may have seen him —affable, black-haired, clean-shaven, athletic; but somewhat serious of mien; possessed of an aristocratic air, as it were.

You haven't seen him? Well, it's of no moment.

At the Hotchkiss end of his run, Larry O'Leary supped, lodged, and breakfasted at Mrs. McNamara's boarding-house. There was a girl there who waited on the table (among other tasks), a timid little thing, shy, unobtrusive, with velvety brown eyes. She was familiarly called Mabel by the boarders.

Larry O'Leary was Mabel's idea of *Beau Brummell*, the Spanish Cavalier, and the Prince of the Enchanted Isles or whatever his name was in the fairy story-book. She— But he didn't even notice that she always brought him the juiciest portion of the chuck-steak. Thus does luck delight in snubbing those who put themselves out to meet the jade half-way.

Larry (we may as well confess it first as last) was in love. As a matter of fact, however, he was only in love with a likeness, thus far.

His affections were centered on a graven image—of a lady. A lady whose classic profile you yourself may have observed in your travels; but you must have looked quick if you did.

I refer to the lady's head which is stamped on our fast-vanishing silver dollar. In short, Larry was an ardent suitor for the hand of Milady Mazuma.

True the vixen had only coquetted with him hitherto, but he yet hoped against odds. Once he thought he had succeeded in winning a smile from his inamorata; it later proved to have been a smile of raillery, not to say disdain.

The thrilling tale of it may be briefly recited. Larry had amassed a few hundred dollars by dint of thrifty saving from his salary. (Sure, it's easy, once you acquire the trick it's done with.)

Having amassed said stake, he proceeded to stake the same on a deal in ten point margins; he had heard of lucky wights who had e'en risen to heights of affluence over night by means of similar ventures.

He was a bull on a ballooning market - for two or three days. Once his profits touched the pleasing high-mark of four figures.

Then the untoward happened. Bears began to bite holes in the gas-connections, and before he could spread a parachute another frightful aviation disaster had been chronicled in the press despatches. Larry sighed regretfully, and began saving up another stake.

It remained for a fat traveling-salesman from Grand Rapids, or maybe it was Peoria, or Duluth, to give Larry O'Leary the idea he had long sought. He got the idea from a story told between stations in the smoking-car.

The fat drummer was on the train when Larry came aboard at Hotchkiss to relieve Jack Richards, brakeman on the west end. He of the adipose tissue was glib, genial, and generous with cigars of inveigling aroma; conversation seemed to gush from him like oil from the bung of a full barrel.

So it came to pass that Larry lingered during an interval when free from the call of duty, entranced by the music of the drummer's pleasant rhapsodies. He had a voice like the purring of a saxophone, and he was a weaver of words into cunning tapestries of heart-interest. As a teller of tales, he— But maybe you've met him on your travels.

No? Well, it's of no moment.

"You live in Hotchkiss?" he said to Larry. "That's some classy little burg. Oh, by the way, I had an adventure there; I made that town last week. You know the dining-room in the Union Station? Well, there's a girl working there as a waitress that - But wait a second.

"First I must hark back to the real beginning. I know it's bum art to do this, but sometimes you have to sacrifice technique for the sake of tone, you know.

"The allusion's too involved for you? Well, never mind

"Once upon a time, some years ago, I found myself obliged to make a twenty-mile, cross-country drive over the unmentionable roads of one of the unbarbered as well as unmanicured counties in southern Missouri.

"Ozark highways are a separate and distinct species of highway. Etched and scarified out of the native rock by having wagons of a primitive pattern worried back and forth over the trail several times a week, the main-traveled thoroughfares are almost passable in favorable seasons of the year. Even then they're the acid test for dental work, and liable to permanently disarrange some of a man's inside machinery, not to mention his kindly and forbearing disposition.

"And when the weather's bad —ugh!

"In that country they follow the line of least resistance in road-building. When the old roadbed gets so a goat can't travel it without risk to life and limb, some hardy pathfinder breaks a new portage through the scrub-oaks. It's great sport But what I started out to tell was that a storm overtook us somewhere between where the trouble began and the jumping-off place.

"Wind, rain, hail, thunder, and lightning, fishworms, and pitchforks. Night black as soot, creek out of its banks, bridges washed out, too deep to ford, driver baffled, not to say bilked; your Uncle Pfudd soaking wet, mud to the chin, and slightly peeved, to put it mildly. A very exciting and depressing state of affairs withal.

"Then—aha! Likewise, what ho!

"A faint glimmer of light shining 'mid the downpour through the wilderness. Gadzooks, *messieurs*. A human habitation! In fact, a real house marooned in that wild and unkempt fastness ten miles each way from nowhere.

"A thousand blessings on the head of the man who first invented shelters in time of stress!

"My driver happened to know the

sturdy pioneer who lived there; he was an old settler who'd come to the country ahead of the railroads, telephones, free mail-delivery, and other conveniences, and was generally considered conservative. In fact, he was called a miser and a hidebound proposition throughout.

"Rich, too; owned lands and chattels, and money loaned at ten per cent. But tight—ouch!

"Supposed to still have all the money that ever passed through his fingers; never was known to spend a cent; wife popularly supposed to've died from exposure and starvation; daughter nearly grown, dressed in rags and barefoot.

"We drove into the barn-lot, unhooked and stabled the team; then we tackled the old skinflint. He consented to let us sleep in the hay at a fair price, so we stopped till daylight.

"Saw the daughter—a right comely looking girl, but peaked and half-clad. Her wistful, forlorn, little face stuck in my memory.

"Some months afterward when I was passing that way I heard about her. She'd run away, they said, and nobody knew what had become of her.

"I didn't blame her. Her father was worth half a million, according to reports, but he treated her like a dog; his only chick and child, too.

"Now, as I said, the other day I ate breakfast in the Union Station dining-room at Hotchkiss. A trim, slim, young woman dressed in neat black with white cap, apron, collar, and cuffs, brought my order. I don't flirt, but I happened to look at her.

"She was the old Ozark miser's daughter! I knew her at once; I'd've known her anywhere.

"There she was, the heiress to half a million, waiting table in a restaurant! Funny deal, eh? Ha—there's the eagle-eye up in front sounding his wheeze for my station. I get off at the next stop.

"Well, good luck, son. Behave."

"Er—do you know the girl's name?" asked Larry hastily, as he rose to announce the impending stop through the coaches.

"Smith," said the fat drummer, "or maybe Schmidt. I'm not certain. But she did the proper thing to beat it. Barefoot and ragged. Nearly grown up, too. Think of it!"

The idea sprouted, budded, and blossomed in Larry's brain by the time his conductor had called "'Board!" and he swung up as the train was moving. His plan's fruition would come later.

He regretted not obtaining a complete description of the heiress so that he could identify her beyond question. She might have taken a different name, thus making the clue of Smith or Schmidt of little or no value.

He thought of telegraphing the fat drummer for additional information, but remembered that he didn't know the man's name. So he very commendably decided to trust to luck and his own cleverness; he had a fairly good opinion of his own cleverness, incidentally.

Larry spent every second night in Hotchkiss, arriving there, no untoward circumstances interfering, at 6.10 P.M., and departing again the following morning at 5.30. The more he thought about it the firmer became his conviction that it was his auriferous opportunity.

He would seek the runaway heiress without delay, and if, when found, she was even half-presentable as to looks, and possessed of the bare rudiments of intelligence, he would promptly marry her, and as joint legatee to half a million in lands and ten-per-cent loans live happy ever after. He utterly ignored the old, paternal tightwad now.

There was one thing he determined he wouldn't do. He positively drew the line at taking up permanent residence in the sodden solitudes of his wife's ancestral acres. No, he would insist upon their living in a livelier seaport.

But then, he ruminated, his wife doubtless would be more anxious than he to avoid surroundings so beset with painful memories.

That night and the next succeeding day he was busy with his plans. The twenty-four hours slipped swiftly into the dim realm of the bygone, and he found himself returned to the scene of his projected conquest.

The first familiar face he saw as he swung down from the rear steps of the chair-car under the station shed at Hotchkiss was the smug mug of Jack Richards, who had just finished waving an ardent adieu to a young woman with straw-colored hair smilingly posted in an open window of the railway lunch-room.

Larry paused expectantly as his friend approached.

"I say, Jack," he questioned with a knowing grin, "who's your fair admirer?"

The other feigned the usual lack of comprehension. "Admirer? Who? Me? What's eating you, sport?"

"Old stuff, kid, old stuff!" laughed Larry. "Who's the baby doll you were signaling?"

"Oh. Why, that was an old schoolmate of mine; a Miss Schmitz, formerly of Minnesota. Nice girl; raised in the country—"

Then, seeming to decide that he'd confided too much already, Richards moved to hurry away.

So-ho! Miss Schmitz, eh? From Minnesota, and an old school friend.

Larry could see that his *confrère* was lying in part; was he trying to mislead for a reason? Could it be possible that *he* was on trail of the heiress?

No, 'twas probably only a chance flirtation. She herself was doubtless responsible for the Minnesota part. A blind lead. She was clever, too, it seemed.

Aloud, he said jauntily:

"Was that Miss Schmitz? I've known her ever since she was knee high. Her father and mine owned adjoining farms. I'll put her wise to you, you boob!"

"Yes, you know her—I bet not. You go trying to queer me with her, and I'll land on you, old top." And Jack moved off, glowering belligerently.

The girl still stood at the window as Larry tripped past. Assured that Richards was watching, he doffed his cap and bowed with a great show of *éclat*.

She returned his salutation with an unmistakably arch smile and nod. A man were a mole to fumble the golden apple tossed by the dimpled hand of Venus herself.

Larry came close to the open window.

"Why, Miss Schmitz!" he burbled. "How long has it been since I saw you? Years and years, I guess. Don't you remember me? I'm Larry O'Leary, you know. Was it St. Paul, or Minneapolis where—"

But the gentle art of ice-breaking is indeed a haphazard avocation. Its devotees proceed by hit-or-miss, and rule-of-thumb methods. After all, though, methods are a minor consideration; the major conclusion is the result accomplished. Hold me no post-mortems of "how-it-happened" if but the end in view shall have been duly attained.

"How do you do?" giggled Miss Schmitz, regarding him calmly with her baby-blue eyes. "Wasn't it in Denver we became acquainted, Mr.—O'Leary? Or was it Palm Beach? A person can't remember all those details when gadding about, can they?"

Rather nifty philosophy that, thought Larry, for a girl who grew up barefoot in the wild backwoods of an Ozark wilderness. But they learn fast, once they emerge from their native fastnesses.

Within ten minutes, Larry and the girl were time-tried friends; he had ascertained that her first name was Minnie; that she wasn't admitting where she came from, only that it wasn't Minnesota; that she thought Jack Richards—was that his name?—quite amusing; and sure Mike she would go to a show that evening—any time after seven.

As evidence of good faith, she gave him the house number and street where she lodged.

Larry stopped at the Sign of the Striped Pole before he went to supper, and took the entire curriculum; haircut,

shave, massage, tonic, skin-food — and later, while he was having a bath, the boy polished his shoes. The proprietor of the shop reproached himself for not having provided a manicurist and an apparatus for cleaning hats while you wait. The gentleman had the appearance of a mazuma-bush ripe for the harvesting.

Miss Schmitz was waiting for him at the prearranged time and place; that is, she was all ready save putting on her hat, furs (oh, yes, they wear 'em in summer), powdering her nose, and taking three or four farewell once-overs in the mirror.

She seemed quite unperturbed before Larry's flowing red four-in-hand and green hat, sartorial triumphs to his mind tremendously impressive. She spoke vaguely of "motors" *en route* to the theater by trolley-car.

The entertainment was a so-called musical extravaganza. If anything, the extravaganza was somewhat worse than the music Miss Schmitz chewed gum right through the entire performance, and yawned openly during the fourth act—if it could have been called an act. She brightened when he mentioned "something to eat after the show."

While they supped (at the Silver Grill Restaurant) Larry craftily steered the conversational bark into limpid pools of personalities. He confessed that he had run away from home at an early age, due to too rigid parental discipline. His companion rose readily to the lure.

"My old dad gave me the worst of it, too," she said. "He treated his dogs and pigs better than he did his only daughter."

"Do you know," he effervesced, "I could soon learn to like you immensely?"

"Yes, I suspected you were awfully susceptible," she told him laughingly.

Just for that he called a taxi to take them home.

In the more matter-of-fact surroundings of his prosy 10x12 room he reviewed the evening's expenditures. Car-fare, theater tickets (down-stairs front), refreshments, taxi—a total of $8.85 in all. He was conscious of a slight twinge, whether of conscience or of purse he wasn't positive.

Of one thing he was confident; Miss Schmitz was the miser's daughter. He wondered if a proposal of marriage would be premature at their next meeting.

Delays were dangerous; there was Jack Richards with all kinds of nerve and a fool for luck in addition—he decided he could decide it later; he had a couple of days leeway, at any rate.

But fate is a double-dealer. She plays with cogged dice. A scant four inches of inadvertence when coupling up the two Gulf Coast sleepers at Brighton Junction, and Larry O'Leary had won a seven-weeks' lay-off in that many seconds.

Willing hands drew him to safety, but with his right foot crushed and flayed to the semblance of raw beef. The local carried him back to Hotchkiss where the company's surgeon thumbed his bruises and opined that with good luck, pluck, and patience, he'd be better than ever in a month, or two, or three.

Then came days of dreary waiting in his prosy 10x12 room at Mrs. McNamara's; days that were long and fraught with tedium. That is, they would have been except for Mabel.

Prince Charming's extremity was Mabel's opportunity. It was she who brought him the daily papers damp from the presses, dog-eared magazines culled from the boarding-house lounging-room, and even an occasional book from an obscure source; she brought flowers, too, and tit-bits smuggled from the kitchen under the cook's very nose; she ran errands for tobacco; she anticipated his needs; shy, unobtrusive, omnipresent, she was a brown-eyed guardian angel hovering near with brooding wing to mother him.

When first confined to his room, Larry thought of writing a note to Minnie Schmitz. Somehow he neglected to do so, and later he promised himself he'd call her over the telephone; but the days fled and he procrastinated.

It piqued him to think that she hadn't troubled to ask about him, although she must have heard of his accident. Richards occasionally inserted a head and shoulders in the crack of his door, but he evaded Larry's importunities regarding the Girl with the Golden Aura.

"Get your mind off of Minnie," Richards jestingly told him. "I've done beat your time with her, I tell you. It's all over but the orange-blossoms, sport."

A day came when Larry was able to hobble down-stairs on crutches, to sit on the front piazza in the summer twilight, waiting for Mabel to bring the evening paper or a tin of smoking from the tobacco-shop down the street. He was not ungrateful for her kindness. Indeed, he fully planned to buy her a new back-comb, or some ribbons, or gloves, or something as a token of his appreciation.

Presently he found himself inventorying her many good qualities; her gentle ways, her thoughtfulness, her cheery, cheerful, feminine faculty of making a fellow comfortable.

One evening he asked her:

"How far is it to that picture theater over on B Street? Three blocks, or four?"

"It's three and a wee mite over," she replied.

"I believe I could walk that far. Would you mind to walk with me?" he asked

"I I'd like it fine," she told him, her eyes shining.

They went more than once, varying the program now and then by attending the Sky-Dome, an open-air stockade where the New York successes of yesteryear were presented by a company of Thespians direct from the Hotchkiss High School.

Larry and Mabel got on capitally together, at a modicum of outlay. She refused to accept attentions that cost over ten cents, an infrequent ice-cream soda being her limit. She was averse to the idea of what she called "frittering away money."

When the cripple exchanged his crutches for a cane, he wandered one day as far as the Union Station. It semed good to smell the aroma of live steam again, and to see the happy, tired, tousled, impatient, well-dressed, tatterdemalion throng of travelers scurrying like ants.

He peeped into the dining-department, but a certain auriferous coiffure was missing. He stood undecided whether to ask at the desk, or—

And then the smug mug of Jack Richards beamed upon him. The two stood chatting for a moment.

"Oh, say," chortled Richards in answer to Larry's unspoken question, "I been wanting to tell you about your friend Minnie; she's done gone and double-crossed you, old top. She was married yesterday. Eloped with a millionaire coal merchant from Pittsburgh."

"A millionaire coal-merchant — from Pittsburgh?" echoed Larry.

"You bet. Pittsburgh, Kansas. Say, I've been kinda wondering. A fat drummer on the train told me she was an heiress. Dad's a miser in the wilds of Minnesota; worth half a mill "

"Minnesota?" muttered Larry. "Why, he told me it was the Ozarks. He must've been stringing both of us. Wonder if he talked with the coal-merchant, too?"

"I'll bet he did," said Richards. "And the guy bit like a catfish, too. That dame was looking for somebody with the coin. I got wise after I'd blown a hundred or so for auto joy-rides and fine eats—"

A minute more of your valuable time, tired reader, and— Oh, yes, about that prior reference to luck. We're just coming to it now.

In the dim dusk Larry limped down to the tobacco-shop for a tin of smoking. At a corner he met Mabel. She was breathless, excited, and considerably perturbed.

"Oh!" she exclaimed. "I'm so glad I met you! A—a horrible man has been following me. He—he spoke to me a minute ago, and and —yonder he comes now. Please tell him to go away."

"A masher, eh?" growled Larry. "I'll fix his clock for him—watch me!"

The man approached them without hesitation. He lifted his hat to the girl.

"Well, say, you!" said Larry. "You got your nerve for a fact. Now listen to me! You play the sidewalk is a drum and beat it, Lord Algy, before somebody steps on your face with both feet, see?"

The man stared.

"How do you get in, my friend?" he said. "I got some business with this young lady—"

"Run on home, Mab," Larry said gently. "I see I've got to beat up this guy. How do I get in?" he turned to the stranger. "I hold all the trumps. This lady is going to be my wife."

"Wait!" the unknown spoke briefly to Mabel. "You two don't wanta get peeved at me. I got good news for you, I have.

"I saw you, ma'am, and tried to tell you my business, but you wouldn't listen. My name's Jones. I'm from up in Iowa. Your name is Mabel Smuythe, ain't it?

"Keep quiet, young man, till I get through. I'm a married man, and this is a matter o' money with me. They's a thousand dollars reward offered for the whereabouts of this young woman; that's what's agitatin' me."

"A thousand dollars reward!" Larry turned to the shrinking girl

She gazed at him abjectly.

"Come, come!" he laughed. "Don't be scared, girlie. The guy's nutty, that's all that ails him."

"Aw, wake up!" said the self-styled Jones. "I been searchin' for this little lady for more'n a month. Her uncle, John Smuythe, in the country up near Des Moines, has died; she's his sole heiress. His estate is valued at up'ards of half a million dollars—in lands and ten-per-cent mortgage loans—"

RAILLERY.

BY BATTELL LOOMIS.

I WALK the rail for balance, a traveling Life's track.
It's easy where it's rusty, but I may not dare look back.
Eyes straight ahead, I step along; for on my left, sheer down,
Declines a desperate valley, while, right, bold summits frown.

WOULD that I were a railroad worm, with surer feet on metals,
Or that some hidden gyroscope might settle what unsettles;
Though sunlight brighten many a scene of lovely natural beauty,
My eyes must follow rust alone; for balancing is Duty.

NO danger is behind me, nor is there fear ahead;
The trains for which my rail was laid have left the watershed;
Yet would I risk security and look ay up or down,
To left declines the Valley of Debt, to right the Cost crags frown.

PERHAPS I am a railroad worm. I've kept my feet so far.
And maybe I've a balance-wheel that keeps my beam at par.
But some day Frost will coat my rail, when doubtless I'll go down
To leeward into the Valley of Debt, beneath Cost Mountain's frown.

MOVING SAILORS BY RAIL.

Even Without Figuring War Exigencies the Government Will Have to Pay for the Steam Transportation of Some 67,000 Jackies This Year.

TARS TO BE WHEELED 37,000,000 MILES.

Costs About 3 Cents a Knot to Give the Navy Boys a Ride Behind the Iron Horse -$1,010,524 Appropriated—Land-Grant Roads Have to Provide Lower Rates—No American Bluejacket Has Ever Been Hurt in Riding the Cushions.

BY JOHN W. KE[illegible].

SAILORS and their dittybags, like porpoises and baby whales, are critters of the deep, blue sea. That's their home, and landsmen seldom think of them as elsewhere. Just the same, few passenger-trains worthy the name steam over a main line without one or more of Uncle Sam's navy men gracing the cushions. Indeed, it is estimated that, collectively, they will travel very close to thirty-seven millions of miles by rail during the present year.

Railroaded Half a Billion Miles.

Since the birth of reliable naval records our sailors have covered fully half of a billion miles over America's railroads, while, curiously, not a single one was seriously injured thereby. Think of that for a record covering fairly sixty years! And this statement is particularly astonishing when one considers how pathetically out of their element these sailormen are, as a rule, when ashore.

They know about as much of the song of the rail as the Indian does of the ships that sail. This is not a reflection upon these men in the least, any more than it would be to compare the actions of a brakeman or a towerman, were they suddenly set aboard ship, with the antics of a bull in a china-shop.

Discipline Saves Jack from Injury.

Undoubtedly, Jack ashore and arail owes much of his strange immunity from danger to the excellence of modern railroad safety appliances and regulations, but the element of strict discipline amid a thousandfold dangers both within and without a big battle-ship at sea must be given a share of any honors bestowed on account of this wonderful record

And the story of moving sailors by rail is an absorbing one. The navy is growing literally by leaps and bounds. Uncle Sam is combing every State in the union for recruits. From the tiniest villages they are sent to the nearest metropolis, and

from the large cities they are transported to the most handy training-station or receiving ship.

There is an immense training-station near Waukegan, Illinois, known as the Great Lakes Station, to which are sent recruits from the Mississippi Valley and

The cost of transporting even one recruit from a central State to the nearest training-station or receiving-ship is no small item. Uncle Sam pays this. And he also furnishes the recruit cash with which to purchase his meals in railroad dining cars or eating-houses

SAILORS AND RAILROADERS SEEM TO HAVE A NATURAL AFFINITY FOR EACH OTHER. THIS CHUMMY SCENE WAS SNAPPED AT PATERSON, NEW JERSEY, WHITHER JACKIES FROM THE ATLANTIC FLEET JOURNEYED TO HEAR BILLY SUNDAY

From a photo by Underwood & Underwood, New York

the Great Lakes region; another at Newport, Rhode Island, caring for the northeastern section of the country; one at Portsmouth, Virginia, to take care of the southeastern section; yet another on Goat Island, in San Francisco Bay, to take care of the great West; while Boston, New York, Philadelphia, Norfolk, Charleston, New Orleans, San Francisco, Seattle, and other large ports are places of rendezvous

Upon the termination of a man's enlistment, or if he be discharged prematurely through no fault of his own, the government furnishes return transportation and subsistence. Other thousands of miles are traveled by men being shifted between the various navy yards and ships as the exigencies of the naval service require.

At the commencement of the present year there were approximately 52,000 men

in the American navy. These enlisted a few at a time, day by day, during the past four years, or an average of 13,000 per year.

Of these, 13,000 will become entitled to leave the navy this year, receiving cold cash with which to purchase railroad tickets to their homes by any direct route they choose. In addition to these, perhaps 3,000 may be prematurely discharged through physical disability, and to fill their places 3,000 must be enlisted in addition to the 13,000 already mentioned above.

Fully 10,000 Men Will Be Shifted.

As to shifting of men from station to station, experience in former years leads to the expectation that fully 10,000 men will be thus moved during the present year.

Congress has authorized an additional enlistment of 25,000 men. So, by adding the 13,000, the 3,000, and the 25,000 enlistments, and the 13,000, the 3,000 discharges, and the 10,000 men shifted, we arrive at the relatively enormous number of 67,000 sailors for whom the government will pay transportation even on a peace basis.

And these sailors will travel an average of six hundred miles, or a total of more than forty million miles, of which possibly three million will be by coastwise steamers and the remainder by rail.

To pay the cost of this transportation Congress appropriated $1,010,524, this sum being worked out by computing the average cost per man which, including meals and sleeping-accommodations, approximates three cents per mile, or, for transportation alone, closely shaves an average of one and three-quarter cents per mile.

This is considerably less than regular passenger rates in most instances, and is made possible because the military branches of the government are entitled under the Land-Grant Acts to certain reductions in fares, and also because of concessions granted by the railroads.

The Interstate Commerce Act—or, more properly, the Act to Regulate Commerce—provides that the railroads may make reduced rates for the transportation of government property, but, curiously, fails to mention the soldiers, sailors, marines, or other national employees. It may have been on the ground that the military are at least the wards if not the animate property of Uncle Sam, that the Interstate Commerce Commission, on May 27, 1907, issued the following ruling:

> Conference Ruling 218. TRANSPORTATION OF FEDERAL TROOPS.
>
> The Commission is of the opinion that carriers, either by contract or bid or other arrangement with the War Department, may lawfully make special rates or fares for the movement of Federal troops, when moved under orders and at the expense of the United States government, and that the rates or fares so made need not be posted or filed with the Commission.
>
> The lawfully published rates or fares for the transportation of the general public, in the opinion of the Commission, are to be regarded, however, as the maximum rates or fares that may lawfully be charged the government for the movement of Federal troops
>
> This ruling also covers similar transportation for the naval and marine services

While not specifically mentioned, certain grants of land given to railroads in pioneer days to aid them in their construction, with compensation to the government in the way of reduced rates for the transportation of its troops and property, undoubtedly influenced the Interstate Commerce Commission in promulgating its ruling.

Land-Grant Roads Must Make Reduction

A majority of these land-grants were to Western railroads, and while in some of them there was no provision in reference to rates, in others it was specifically stipulated that both the troops and property of the government were to be carried at reduced rates; while in other cases, and unfortunately only a few, the grants ordained that there was to be no

HERE'S THE WAY THE YOUNG IDEA WALKS INTO THE RECEIVING-BARRACKS FOR A BATH PHYSICAL EXAMINATION, HAIRCUT, SHAVE AND UNIFORM OUTFIT

charge whatever for providing such trans portation.

When the Northern Pacific was built it was given 31,658,331 acres of public lands, in return for which it agreed to carry members of the army, navy, or marine corps between Seattle and St. Paul for $21.08, with accommodations on a par with second class or "tourist" passengers, who paid $40.00

It would seem, surely, that the most rabid advocate of equal rights can hardly blame the Federal government for demanding a cheaper fare for its soldiers and sailors than is charged the general public in view of these enormous land-grants.

To view this subject from another standpoint, it is obviously the general public who pay for the upkeep of the national defense, and any moneys saved thereby must revert to their own monetary credit

In some cases Uncle Sam drove a more thrifty bargain with the railroads. When, for instance, the Southern Pacific was handed the magnificent plum of 16,012,228 acres of public lands extensively grouped along its line between Roseville Junction, near Sacramento, California, and Portland, Oregon, it was stipulated that henceforth Federal fighters, their accouterments, and the property of the government generally must be carried absolutely free of charge between the two points named—a distance of 663 miles

Lower Fares for Sailors and Soldiers.

From the earliest days of railroad construction, due no doubt to a desire to share Uncle Sam's patronage—to go fifty-fifty, as it were, with the old, privileged land grant roads– it has been the general custom of practically all American railroads to concede a reduced rate of fare for soldiers and sailors, resulting in what is commonly known as equalization of military rates

There are many documents in the government departments covering the history of these land-grants to the railroads, and they make highly interesting reading

Promptly upon the promulgation of the

Interstate Commerce Commission ukase allowing all railroads to quote reduced fares for Federal soldiers and sailors, new life was instilled into the transportation work of the military branches. The Navy Department waxed busy and, through its Bureau of Navigation, organized a division for the sole purpose of handling its sailors arail.

Each spring this bureau invites competitive bids from all trunk-lines. It asks the lines for their lowest prices for transporting its sailors between certain main points of travel, and especially between all cities containing recruiting stations and the big training-stations, while traffic between the great navy yards and stations is also carefully looked after

Bids Are Opened in Washington.

The bids of the various railroads are opened in Washington, where they are carefully scrutinized by experts to ascertain just what they cover. As every ticket-agent knows, it is often quite difficult to determine from the commercial tariffs the exact rate between two points

It is not strange, therefore, that it is often quite difficult to express in plain English the rates that are to apply on military business between two sections of the country. This is especially true when land-grant rates are involved Problems frequently arise in connection with the interpretation of some of these contracts that would puzzle the proverbial Philadelphia lawyer, and the auditors and legal lights of the government have at times developed unforeseen "jokers" illustrating what a fearful and wonderful thing is the English language

In the olden days it was generally Uncle Sam who discovered that the gentlemen who were operating the railroads had not been quite as liberal with him as he had thought and who was obliged to dig down into the Treasury for a little extra cash

It may be said, though, that your Uncle Dudley—né Uncle Sam—has long since profited by these innumerable jabs into his pocketbook made by jokers of yore. and that now, when a transportation contract bears thereon the imprint of an

AND HERE'S THE WAY THE YOUNG IDEA STANDS UP SHORTLY AFTERWARD TO HAVE ITS FIRST OUTFIT INSPECTED EACH ARTICLE IS MARKED WITH THE OWNER S NAME

eagle's claws, a cluster of stars, and an illegible streak of highly official ink, the tiny little points which used to tickle the joy-nerves of olden-day railroad magnates are seldom found therein.

Big Printings of "Instructions."

After the contract has been signed, or other satisfactory arrangements agreed to, the Bureau of Navigation, through its sub-bureau or transportation division, gets busy. Instructions, in the nature of tariffs, are printed covering every phase of the original contract or contracts, so that no matter what emergency arises all those concerned may be instantly guided without any trouble or doubt.

These instructions are broadcasted among all recruiting-stations, naval stations, and yards. This may seem foolish. Why should Goat Island Station, in San Francisco Bay, be bothered with a wad of instructions regarding the transportation conditions between Washington and New York, or between Milwaukee and Waukesha, Wisconsin?

In the first place, John Smith, electrician radio, first class, may have been ordered to leave San Francisco station and join the good ship Pennsylvania at New York. The paymaster at Goat Island consults every possible combination of rates between the two cities, and he may find that a routing *via* the national capital is advantageous either on account of the commercial fare, the government contract, or the shorter time with its correspondingly lower amount of cash for meals, and Smith is therefore routed *via* Washington.

Reason in All the Red Tape.

Again, maybe it is discovered that Smith has a weakness of the heart, and it is necessary to send him home to Waukesha at government expense, so he can board a canoe on Lake Pewaukee and blow to his girl of his feats in the navy. The paymaster once more consults his instructions and finds that by routing Smith *via* Chicago and Milwaukee he can save a dollar or two for the Treasury.

There is much cry about so-called government red tape; but in truth there is mighty little of this article of which it may not be said, as of the cereal "There's a reason."

Then the Bureau of Navigation prints some more. It sends out blank orders for transportation, and it sends additional blanks upon which the enlisted man reports his movements as soon as he reaches his destination.

Better to illustrate the bureau's system, we will suppose that Richard Roe, recruit, enlists at Chicago. In civil life he is a railroad telegrapher of proven ability, and he has applied for a rating in the navy as a wireless operator, or "electrician radio."

Roe is first sent to the electrical school at Brooklyn to learn Continental code, so the recruiting-officer studies his New York statements. Maybe he finds that the Erie is entitled to the business, and if so he issues an order on the Erie in Roe's name calling for a ticket to New York, making a record of this fact for the information of the department.

How the Railroad Gets Paid.

This order is handed to Roe, who presents it to the Erie ticket-agent in Chicago and receives in exchange a ticket to New York. Roe is also given his travel orders, cash for meals and transfers *en route*, an order for a Pullman berth, and thorough instructions as to his schedule.

Besides, he is given a report blank to be filled out at his journey's end and handed to the officer to whom he reports, giving full details of his travel. This report is forwarded to the Bureau of Navigation, and a record is made indicating that the Erie has performed the service and is entitled to proper remuneration therefor.

In due time the Erie submits its bill for Roe's transportation, attaching thereto the original transportation order. The bill is compared with Roe's report, with his travel orders, and with the reports of the navy officers at Chicago and New

York and, if found O. K., approved by the Bureau of Navigation and sent to the disbursing-officer of the department for checkage of the rates involved.

Should the Erie's bill tally with the disbursing-officer's ideas beyond any manner of doubt, the latter sends the accounting-officers of the Treasury. A check issued by a disbursing officer may always be cashed without depriving the railroad company of the right to appeal if it so desires, whereas should an auditor's warrant be offered and accepted there is no appeal to the comptroller.

IT'S GOING TO BE HOLIDAY TIME SHORTLY FOR THESE BOYS, FOR UNCLE SAM'S SAILORS AS A RULE ENJOY RIDING THE CUSHIONS AT THEIR LANKY RELATIVE'S EXPENSE SCENE IS AT THE NAVAL TRAINING-STATION, GREAT LAKES, ILLINOIS

Erie his check for the amount, and the affair is ended. However, at times, especially wherein there has been travel between infrequent points or by out-of-the-way routes, the disbursing-officer may pass the bill to the accounting-officer of the Treasury Department known as the auditor for the navy, who further checks the account and renders an opinion.

Should the Erie be dissatisfied with the auditor's diagnosis, it may appeal therefrom to the Comptroller of the Treasury, who has supreme authority over all appropriations for the support of the government

The Etiquette of Kicking

And right here is a point or two which many railroad auditors fail to understand. Bills are paid by the disbursing-officers of the several departments, or by the

In this it is evident that the government figures that the computations of the departmental disbursing-officers may possibly be in error at times—due, perhaps, to insufficient data while the auditors of the Treasury are equipped with absolutely every available fact, rate, and rule covering a case, and their decision must be correct. Still there is open a right to appeal to the comptroller provided the auditor's warrant has not been accepted

Supposing, then, that the Erie has refused the auditor's warrant in Roe's case and has appealed to the comptroller, whose decision the railroad also rejects. Under the law the comptroller is supreme over such expenditures, but the railroad may appeal from his decision to the Court of Claims, and finally even to the Supreme Court of the United States. In case of appeal to the Court of Claims or

the Supreme Court, the cashing of the warrant does not effect the suit.

$15,000,000 a Year for Passenger Fares.

Maybe all this seems cruel and an unnecessary hardship, particularly when amounts involved are comparatively insignificant; but it must be remembered that in ordinary, normal years the sum of fully $15,000,000 is expended by our government for passenger transportation alone.

Fifteen millions is an enormous number of dollars. The public foots the bill directly or indirectly, and every cent that can be saved is a public benefit.

The railroad passenger solicitors might do well to familiarize themselves with the various branches of the naval service, so that when they call at the department for information about any particular cruise or shifting of men in contemplation their questions can be intelligently answered.

A request for information in reference to marines when enlisted bluejackets are meant, reservists instead of State naval militia, or maybe civilian cruisers, is sometimes confusing.

Bluejackets are the navy's "regulars," on permanent duty. Marines are a separate branch of Uncle Sam's organized military force, serving on both land and sea.

Reservists belong to a secondary branch of the navy recently created by Congress, who have bound themselves to serve in time of war, and who are trained a few weeks each year of their four years' enrolment.

Railroaders! Want to Take a Cruise?

State naval militiamen are State troopers who are given annual training-periods aboard ships of the fleet, while civilian cruisers are volunteers who are bound by no agreement to fight, but who pay their own expenses to and from ship, and while on board ship during their annual cruise.

The purpose of this annual civilian volunteer cruise is simply to give the general public a fair acquaintance with the navy. Any railroad men with a technical training, such as telegraphers or men with a common-school education, are eligible to make the cruise. Uncle Sam pays everybody's expenses excepting the civilian cruisers.

When the Smiths and Roes start upon their journey they are given blanks upon which to report their observations and opinions of the railroad services rendered them, and their remarks are often rather pointed:

"This line puts too much water in the milk."

"The officials of this road are almost perfect gentlemen."

"The road-bed reminds me of an empty collier in a high sea."

"I could eat twice as much, and they don't pipe down on time for meals."

Sullivan Boosted Murphy.

"They feed swell. I recommend giving them all your business."

This last remark was from a sailor named Sullivan, but the dining-car conductor's name was Murphy, which somewhat weakened the recommendation.

It might be thought that these remarks by traveling sailormen, rough, open, and often sarcastic, should carry little weight, but they do. It is practically the only means by which the department can ascertain whether its men are receiving the treatment due them while they are arail.

Upon the principle of the value of cumulative testimony it is fair to suppose that if an overwhelming majority of bluejackets traveling over any one particular road should report dissatisfaction with some item of their accommodations, there must be something wrong, and when this is noted the government investigates.

Again, these comments are particularly welcomed from sailors traveling abroad, as they furnish the department in some cases with its only information in reference to foreign schedules. Just at present the farmer could say of foreign schedules as

he did of the hippo at the zoo, "There ain't no such animal."

Our navy, for example, has several ships permanently stationed at certain foreign ports. One of the navy vessels, the U. S. S. Scorpion, is anchored before Constantinople, and since the European

Some stations on our own coast are "birds" in this respect, such as Cape Blanco, Oregon, the information regarding transportation to which reads in part as follows.

Railroad station, Roseburg, Oregon, distance, 112 miles. Transportation thence by

TA-TA! THEY'RE TAKING ADVANTAGE OF A SHORT LEAVE OF ABSENCE TO GO ON A LITTLE JUNKET BY RAIL. A FINE-LOOKING SET OF BOYS, THESE RAILROAD-RIDING WEARERS OF THE BLUE

From a photo by Underwood & Underwood, New York.

upheaval it has been found difficult either to relieve her men entitled to their discharge and passage back to the States, or to send new men to take their places. The only route available in an emergency is *via* the Balkan Express, running between Berlin and the Turkish capital upon an uncertain schedule; and the rupture between the United States and Germany in the early part of the year rendered even this route of problematic value.

4 Days to Go 112 Miles! Wow!

The Navy maintains substantial stations in Cuba, Alaska, Hawaiian Islands, Guam, Samoa, Porto Rico, and the Philippines, all of which, together with a number of wireless plants at out-of-the-way places, give the department no end of worry in the matter of transportation both afloat and ashore.

stage and boat; cost, $30 to $35; time consumed, three to four days.

Three or four days to travel a matter of 112 miles!

There is one peculiar truth about our traveling Jackie which would seem inexplainable. He seems to be able to travel to Timbuctu, or Jolo, or Olongapo, with perfect ease and after but a preliminary shove. He is at home abroad.

But set him to traveling through a thickly populated portion of the United States, where he has several chances to make mistakes, and he now and then goes astray. Cities in several States bearing simular names seem to bother him considerably.

Not long ago a sailor was ordered from Newport, Rhode Island, to Rockport, Massachusetts. Now, it is common to send these men to Rockport, Maine,

where so many big battle-ships are given their preliminary test runs; so, probably knowing this, the ticket agent, believing an error had been made by the Bureau of Navigation, argued that the ticket should read to Rockport, Maine.

Knocking About the Rockports.

The sailor, evidently reasoning that one Rockport must be as good as another, agreed with the man at the window, and sallied forth happily to his Maine destination. Here he failed to find his ship, of course, so, after waiting impatiently for a few days, he concluded to return to Newport for a fresh start—at his own expense

Back he went, and back he came, this time to Rockport, Massachusetts, a day or two after his good ship had plowed forth therefrom. In the mean time his dittybag in the baggage-coach ahead had gone off upon a journey or two of its own, and it took a week of playing tag up and down the New England coast before the final happy reunion of ship, Jack Tar, and dittybag.

"Pigs is pigs." There is a certain sailor in Uncle Sam's navy who will swear to it. He was *en route* from St. Louis to New York *via* Chicago.

His dittybag went off on a tangent, so he arranged with an old shipmate in Chicago, to which city the bag had been checked, to watch for it and forward it to an address in New York which he promised to send his friend as soon as he arrived at his destination.

Dittybag, Disagreement, and Demurrage.

However, he found his ship whistling the "all-aboard" signal, and sailed away to the West Indies, while his friend impatiently awaited that address. He waited some more, and the dittybag arrived in the railroad baggage-room, and there it waited, and waited some more; and in the mean time demurrage charges accrued and multiplied, like the pigs in the story.

Finally the Jackie in the West Indies wrote to the friend in Chicago, and while dollars piled upon dollars in demurrage charges the two argued a bit by mail. Then the department, getting wind of the affair, investigated and decided that the traveler had no business abandoning his dittybag even to the tender attentions of an old and tried shipmate; so official hands were washed of the affair.

The railroad consulted its Blackstones and Bouviers, and found that, much as the road would love to accommodate the bluejacket, they could not release the bag without full payment of charges on penalty of heavy fines for violating an Interstate Commerce regulation in such case made and provided, to wit, whereas, and resolved.

And those charges kept on emulating the pigs by multiplying and multiplying some more. Somehow in this particular case a compromise was reached, and the young sailor aboard ship in the West Indies finally got his better half.

Mystery of the Missing Messmen.

Now and then the sailorman, and not his dittybag, will go astray—drop out of sight *en route*. Circumstances and past records indicate to the department that the man has not deserted; so, like a big-hearted mother, it worries, and moves heaven and earth to find its child. There is, in truth, no limit to which Uncle Sam will not go to succor one of his bluejackets in distress, if innocently so.

Some time ago two Filipino mess attendants of the navy were sent from Seattle to New York to join a ship at that station. They failed to report at their journey's end within a reasonable time, and the department immediately got in touch with the Great Northern, the initial line out of Seattle, and through that road traced the tickets furnished the two sailors as far as Buffalo.

By luck an official suggested that the train the tars were to take out of Buffalo carried sleepers for both Boston and New York. The two Filipinos, it turned out, had got into the wrong sleeper and stayed there. They were found trying to make

head or tail out of Boston's labyrinth of streets, and they were more than somewhat hungry.

Somehow, though, Providence seems to favor the uniform and guard Uncle Sam's wards arail; but Uncle Sam also does some guarding, and no man riding the cushions has a better friend, a stancher guardian, or more powerful protector than the bluejacket who works for the tall man with striped trousers, a starred vest, a stovepipe hat, and a goatee.

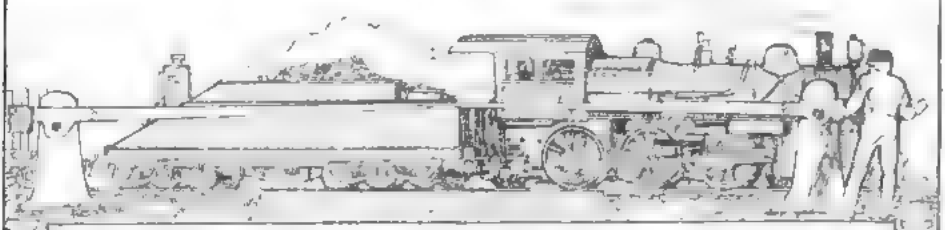
UNIQUE PASSENGER-ENGINE.

BUILT IN 1876, THE LAKE TAHOE RAILWAY AND TRANSPORTATION COMPANY'S OLD WOOD-BURNER "ONE," IS STILL IN REGULAR PASSENGER-SERVICE

A WOOD-BURNER, which has been running since 1876 and is still in active use hauling passenger on a regular schedule, can lay claim with a good deal of justification to being unique among locomotives employed in transporting human beings, as regards both length of service and type of fuel used

Such an engine is the old "One," belonging to the Lake Tahoe Railway and Transportation Company, whose line runs from Truckee, California, to the beautiful Lake Tahoe. Built by the Baldwin Locomotive Works, its wheels have been turning ever since the Centennial year. It was first used in logging work, but was promoted to passenger service when the present Tahoe line was built. It still uses wood as fuel. Note in the picture the old-time diamond stack.

Notwithstanding the ripe old age of this locomotive, its mileage is not to be compared with some of those rolled up by much younger engines on trunk lines. This is for the reason that the Tahoe road is only some sixteen miles long, being operated mainly if not wholly to haul visitors from the junction point with the Southern Pacific to the great mountain lake. Moreover, the road being operated at an altitude of more than 6,000 feet, the officials find it impracticable to run trains more than six months in the year, owing to the heavy snows.



ON SHORT TIME.

BY C. B. CALKINS.

SHE was lame and loose and leaking, and the coal was full of slag,
As she staggered up the mountain grade with all that she could drag.
The hogger watched the pointer, while the brawny tallow-pot
With vain, herculean efforts, tried to keep the scrap-heap hot.
Ten miles away the summit loomed, and there the hogger knew
That Number Four, the Fast Express, at ten fifteen was due.

THE eagle-eye pulled out his watch; nine forty-five it read.
"Just thirty minutes more to make the next ten miles," he said.
Then, turning to the sweltering, sweating, swearing, grimy smoke,
With a world of wrathful meaning, these stormy words he spoke:
"I want more steam," the hogger roared. "I want the engine hot!
D'ye think we're coasting down the hill, or standing on the spot?"

THE fireboy grabbed the clinker-hook, and wrestled it with rage.
With hook and scoop he fiercely worked, until upon the gage
The hesitating pointer slowly, surely, came around,
And the boiler-pressure registered almost two hundred pound.
The eagle-eye put on the gun; again he pulled his watch.
Then gently, with a peaceful smile, he dropped her down a notch.

THE O. R. C. was raging wild back in the "cupalo";
He watched the passing mile-posts, in procession all too slow.
"What's the matter with the hog-head up ahead?" he cried in rage.
"Don't he know we've got a time-card? Can't he read the printed page?
Can't he see that Number Four is there among the carded trains?
I never knew a hog-head yet that had an ounce of brains!"

JUST then the hogger dropped her down; the old mill gathered speed;
The con calmed down, and soon his face from frantic rage was freed.
The mile-posts passed more swiftly now, there were not any more,
So they just pulled into Summit in time to clear for Four.
And there at Summit siding they had to lie and wait,
For Number Four, the Fast Express, was just —two— hours—late.

FROGS.

St. Paul is to have a great new union station.

Southern Pacific reports no passenger killed in 1916.

Southern Railway has specially built typewriters for making way-bills.

Three-quarters of a million men dig the coal that American railroads carry.

During 1916 1,098.41 miles of new lines were built in the United States.

Nearly 400 trains leave the Pennsylvania Terminal in New York City daily.

Pennsylvania Railroad has posters along right-of-way warning persons not to walk tracks.

Agitation for a standard box car is revived, and a design is being made by a committee of experts.

"Getting on or off cars" is the chief cause of injury to passengers and trainmen. *Watch your step!*

Complaints that some enginemen do not sound their whistles long or loud enough at highway crossings.

Miles of siding and yard tracks in Canada have been torn up and shipped to France for military necessity.

Total number of persons killed in all train accidents during April, May, and June, 1916, was 2,304; injured, 46,204.

Duties of a B and O. trainman include telling passengers why trains are being delayed—just so they won't sit and wonder.

Ha, ha! Panama Canal hasn't put the transcontinental railroads out of business yet—remember how the gloom-merchants said it would?

Union Pacific kept all employees on pay-roll during militia service on Mexican border, and restored old positions when they returned.

The bulk of passenger traffic in Europe is second and third class; here, less than six per cent travel second class. America insists upon style.

Minnesota physician has invented a fence to prevent snow from drifting on railroad tracks, transverse planks deflecting the air currents.

Monument to keep fresh the memory of General Grenville M. Dodge, builder of the Union Pacific, is to be erected at Council Bluffs, Iowa.

Bad memory is expensive for railroad ticket-sellers, for they must deduct from wages what they lose for the company by selling under the rate.

D. C. Buell, director Railway Educational Bureau, Omaha, says: "Railroad managers are hard pressed to get men for many classes of service."

Centre Street Loop, New York subway system, less than two miles in length, cost $16,080,964.09, being the most expensive railroad line in the world.

Seemingly the normal hobo death is by

the railroad route, latest annual figures showing that 5,084 trespassers on railroad property were killed.

Records in Iowa show that since 1848 just 703 railroads organized and promoted in that State flivvered and perished from the earth before a rail was laid

Miss I. Sutherland, agent, Pomona, Georgia, discovered washout on line and heroically flagged fast freight in nick of time, winning praise from officials.

Louisiana Supreme Court holds that a traveler who contributes to a railroad-crossing accident by failing to stop, look, and listen cannot recover for damages.

One year's of educational work on the Erie reduced number of trackmen killed 48 per cent, injured 20½ per cent; also cut number of shopmen killed by half.

Seaboard Air Line has two 52-ton gas-electric motors on the main line between Jacksonville and Savannah first time such motors have been used on main-line service

Those who remember the deadly "link and pin" will be glad to know that to-day there is an average of only one man killed per month in this country while making couplings.

Los Angeles and Salt Lake officials recently wrote each employee, asking co-operation to increase the company's freight and passenger business by $15,000,000 in 1917.

American locomotive and car builders received orders in 1916 for 2,891 locomotives, 165,324 freight-cars, and 2,540 passenger-cars, for use on American and Canadian railroads

Coal miners have learned the railroad "safety-first" plan, and last year only 2,225 were accidentally killed, which was 3.03 for each 1,000 employed, the smallest death-rate in many years.

The number of steel and underframe cars in service at the last count was 10,884 steel and 5,197 underframe in the passenger service, 514,962 steel and 680,531 underframe in freight service

If more people would order and store next winter's coal supply during the summer they would pay less, and there would not be such dire shortages as occurred this winter in many cities.

Santa Fe methods of selecting and training apprentices call for grammar-school or better education, good health, ambition; they offer vocational preference, kindly assistance, scientific instruction, and a life job.

By connecting with the Nashville, Chattanooga and St. Louis at Paducah, Kentucky, the Burlington will establish a through service from Seattle, Washington, to Jacksonville, Florida, the longest continuous train service in America

Carnegie hero-medal to Jerry Fountain, one-armed crossing-watchman on the Alabama Great Southern, Bessemer, Alabama, for saving life of aged man, dazed before onrushing train; both struck, and Fountain bruised, but wayfarer unhurt.

Ignorant Italian laborer bought four tickets to "Newark" before he arrived at the Newark, in the State of New Jersey, he was destined to. He visited Maryland, Ohio, New York, and New Jersey before he got to the right Newark

Two brothers in Minnesota fifteen years ago received from the Chicago, Milwaukee and St. Paul damages for fire set to a wheat-field by a locomotive-spark. The railroad paid fifty dollars too much, and the conscience of the brothers has been bothering them since, so they have refunded the fifty.

The Sunny Side of the Track

BEING unable to find a seat on the overcrowded train, a large woman went into the smoking car and sat down by the door. The man next to her, absorbed in his newspaper, kept on smoking

"I was foolish enough to suppose," she said, glowering at him, "that some of the men in here, at least, were gentlemen."

"Pardon me, madam," he answered, politely offering her a cigar.—*M., K. and T. Employees' Magazine*

Q.—Why is a train contagious?

A.—Because people catch it at every station.—*Santa Fe Magazine*

THE railway board had met to consider the case of old Tom Jones, who in a train accident had become deaf

"Well," said a director, "old Tom has been with us a long time, and we want to find him a new job. What do you suggest?"

"I know," said the chairman. "Let's put him in charge of the complaint department."—*Tit Bits.*

THE telephone in a physician's office rang madly, and the following conversation took place:

"We want the doctor, quick!"

"Who's sick at your house?"

"Everybody except me. I'd been naughty, so they wouldn't give me any of the nice mushrooms papa picked in the woods."—*Current Opinion.*

A SOCIETY for disseminating religious literature sent a bundle of tracts to a railway manager for placing in the waiting-room, with the title, "A Route to New Jerusalem." He returned them with the message: "We cannot place the tracts, as New Jerusalem is not on our system."—*The R. R. Red Book*

BONES, a hostler, failed to turn up at the roundhouse one morning

"His father's dead, sir," explained another hostler to the boss

"Oh."

The next day again Bones failed to turn up And the next day still he was absent

"Bones not about?" asked the boss.

"His father," said the other hostler, "as I told you before, sir—"

"Well look here," said the boss, "you slip on your coat and run around to Bones's house and find out if he intends to stay away all the time his father is dead."—*Exchange.*

WIFEY: "On your way home, will you ask that telegraph-girl at the railroad station to—"

Hubby: "You mean that maiden with the blue eyes, blond hair, ruby lips, deep dimples, and graceful carriage?"

Wifey: "Oh, you needn't mind. I intend going to town myself to-day."—*The Froth*

IT was Saturday afternoon and some of the boys in the Sedalia car-shops' office were discussing the commercial possibilities of aeroplanes. One of the colored brothers who was waiting for the return of W. F. Crowder overheard what was being said, and became deeply interested in the proceedings. At the close of the conversation he shook his head solemnly and remarked

"White folks may do great things wif dem dah flying machines, but one thing ah knows foh suttin—dey ain't neveh goin' to need no Jim Crow cars on 'em. No, suh!"—*M., K. and T. Employees' Magazine*

HE was one of those clever people who are always trying to take a rise out of some one, and his latest selected victim was a lady bus-conductor

"The Somme, please!" he said with a grin, tendering a penny as she came for the fares

Nothing happened until the vehicle passed a recruiting office. Then the fair conductor tugged at the bell-rope and announced loudly:

"Change here for the Somme!"—*English Exchange*

BYSTANDER: "I suppose you would like to take a ride without worrying about tires and the like?"

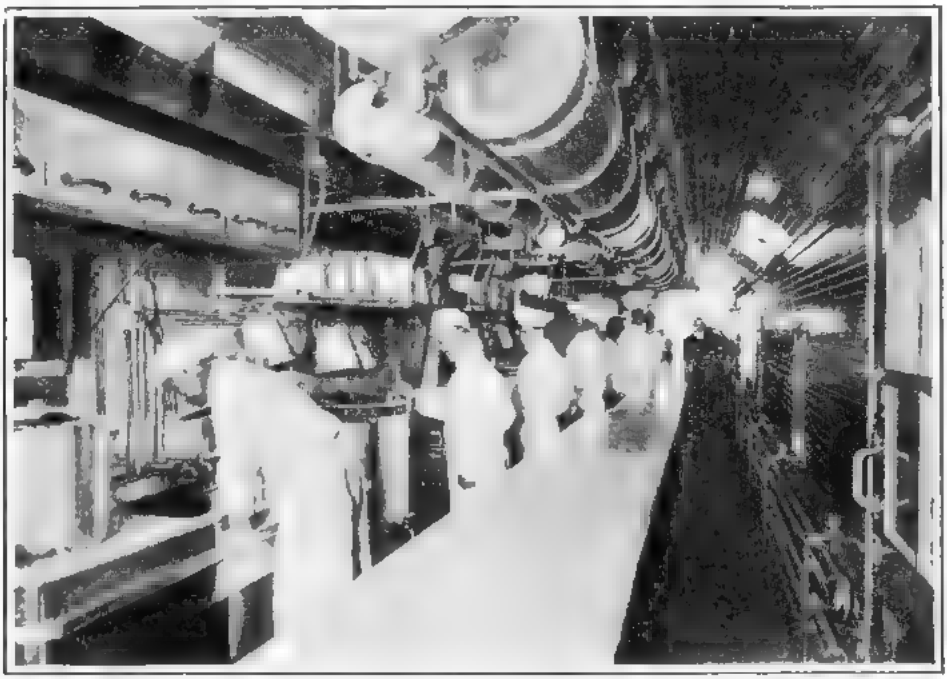
Motorist (fixing a puncture): "You bet I would"

Bystander: "Well, here's a railroad ticket"—*The Chaparral*

KNICKER: "Folks are queer."

Bocker: "Yes; the ones who stop, look, and listen at a keyhole won't do it at a railroad crossing."—*New York Sun*

COOKING ON TROOP-TRAINS.



GRAND TRUNK'S NEW MILITARY COOKING-CARS CAN PREPARE MEALS FOR 1 200 MEN AT A TIME WHEN READY THE FOOD CAN BE SERVED IN 15 MINUTES

OVER the border in Canada there has been some lively railroading on account of the war. A feature of it deals with the feeding of the military forces while aboard the special trains that carry them to the seaboard

For the purpose specially built military dining cars are used. It is believed that no country in the world has ever faced the problem of carrying over so great a distance by rail such a vast number of men; and to meet the situation the rail road managers were compelled to devise something new in the way of cars to prepare and serve meals. The ordinary car can feed thirty people at a sitting, but the demand was for one that would serve hundreds of men at one time.

The Grand Trunk commissary car, shown herewith, is the largest traveling kitchen ever devised. It is eighty feet long, has a full sized hotel range, steam cooker, sixty-foot refrigerator space, and storeroom with several tons' capacity

Eight cooks work without confusion. They pass the meals to the long counter, where they are carried back into the coaches by the military waiters.

When a battalion entrains the Commissary Department is always the subject of keen interest among the men in khaki Two of the big kitchens are then used, the military special being run, usually, in two sections. The commissary car is placed in the center of each section

The service is after this fashion: The cooks spread the piping hot dishes of food on the counter. Two waiters take the big trays of meat and potatoes and pass them through the cars, the men remaining in their seats

Other waiters pass through with bread and butter, coffee, pastry, *et cetera* Within fifteen minutes after dinner-time has been sounded every man is busy with his meal Serving over twelve hundred men in a quarter of an hour is believed to be a new record on any railroad train

By the Light of the Lantern

Ask us what you want to know

WE want to be as useful as possible to our readers, but, because of the great popularity of this department, we are obliged to impose certain restrictions. It is limited to the answering of questions of an informative, technical, or historical nature concerning the railroad business and allied occupations only. We cannot answer requests for positions or give information regarding employment. All letters should be signed with the full name of the writer, as an indication of his good faith. We will print only his initials. The editor begs that readers sending in questions will not be disappointed if the answers do not appear as early as expected. It frequently takes weeks to secure correct answers, owing to the complexity of the questions. All questions are answered free of charge. The editor earnestly requests his readers to bring immediately to his attention any errors they may find in this department. He reserves the right to refrain from answering any question

AIR-BRAKE INVENTIONS.

A. J. B., Lewiston, Maine.—We have examined the clippings which you sent us from the *Lewiston Journal* in regard to the inventions of the late Robert Spear. It is evident that the writer of the article referred to has not the remotest idea of modern air-brake practise, and is certainly misinformed as to the earlier developments and application of air-brakes for railroad service.

The safe operation of railway trains to-day is, of course, dependent upon air brakes, but to attribute the invention and development of the modern brake to any one but George Westinghouse is pure folly. The one insurmountable obstacle to uniform air-brake operation at the present time is due to the friction or resistance to the flow of compressed air through the brake-pipe, and this has never been fully surmounted by anything except by the operation of the brakes by electric current, as is the case in the electro-pneumatic brake.

During the first seventy years of the last century no less than 055 patents were granted in England and the United States for various kinds of railway brakes. Of this number only 35 were pneumatic brakes.

The first air brake was a vacuum-brake, patented by Nasmyth and Clark in 1844, and in 1848 Samuel C. Lister patented an air-brake that was practically the same as the Westinghouse straight air-brake, that followed some years later, except that it was operated by a guard or brakeman and not by the engineer.

The Westinghouse straight air-brake was brought out in 1860. At that time it was the simplest and most efficient that had been introduced. It was largely adopted by the American railroads. While this form of brake was all that could be desired for a single car, the danger of the entire loss of braking-power when a hose burst under pressure, or when the train parted or the brake system ruptured, led to the invention by Westinghouse of the automatic brake which he introduced in 1872. The subsequent developments in the art may be said to date from that time.

Therefore, the claims of the author of the *Lewiston Journal* article are, in our opinion, absurd. We are not surprised that you failed to find a description of the Spear inventions and the new friction-pipe in the text-books you had consulted before writing to us.

PULLMAN OFFICERS.

E. M. L., Bridgeport, Illinois.—See our answer to H. E. S., Worcester, Massachusetts, in this issue. We cannot give you any better advice than what was furnished by your railroad friends.

TRAINMASTERS.

J. R. R., South Lakewood, New Jersey.—A complete list of all the trainmasters and the points at which they are located on all the roads which you mention would be entirely too long a list for publication in this department.

You evidently overlook the fact that there is more than one trainmaster on each road, and the lines that you include would make such a list that it would not be of sufficient interest to our readers generally to give so much space to a

question of this kind, much as we would like to accommodate you. The "Pocket List of Railroad Officials" sells at one dollar per copy. It is issued quarterly by the Railroad Equipment and Publication Company, 75 Church Street, New York City. The annual subscription price is two dollars

SANTA FE TYPE LOCOMOTIVES.

F. C. V. G., New Virginia, Iowa. The Santa Fe type locomotive is an engine having a two-wheel truck in front, ten driving wheels, and a two-wheel truck in the rear. It is more generally known as the 2-10-2 type. Engines of this design are known as the Santa Fe type for the reason that the first was built by the Baldwin Locomotive Works for the Atchison, Topeka and Santa Fe road

SOUTHERN RAILWAY MILEAGE.

R. H. N., Duncan, Indiana. The Southern Railway Company operates 6,082 miles, but this figure includes the owned, leased, and operated lines as well as the trackage rights over other lines

RAILWAY AGE GAZETTE.

L. W. W., Belmont, Massachusetts.—The *Railway Age Gazette* is published weekly by the Simmons-Boardman Publishing Company, Woolworth Building, New York City. The subscription price is five dollars per year. Single copies fifteen cents

PULLMAN COMPANY.

H. E. S., Worcester, Massachusetts.—We cannot furnish the information you wish. Suggest that you communicate with J. T. Ransom, General Superintendent, Pullman Company, Chicago, Illinois, or the district superintendents of the company at Boston, Massachusetts—J. L. Baldwin at the South Station or P. O. Sauer at the North Station—who will probably be able to give you the particulars you desire

YOU DON'T BUY A JOB.

H. R. E., Columbus, Nebraska, writes: I have written to a correspondence school in regard to their course, and, while I do not care about the price they charge, I want to know if I will be able to get a position on a railroad after taking their course?

How should we know? Is a student at a school or college assured of employment or a successful career as a doctor, as an engineer, or in any other profession because he has, or rather thinks he has, completed a course of study for such professions? We think not.

We also believe that the day when so-called correspondence schools guaranteed employment by railroad companies to students completing their courses is past. We are certain that railroading is an industry in which those engaged in it generally begin at the bottom and work to the top.

Young men expecting to complete a correspondence-school course and immediately step into a position of responsibility on a road are sure to be disappointed. All the good positions on railroads are not vacant. Promotion is what counts, and it stands to reason that in entering railroad employ, or when vacancies occur, the individual best qualified will secure the job.

Much depends on the man himself, and that a course of training, whether obtained from a correspondence school or otherwise, will help him to qualify is unquestionable.

ROUNDHOUSES.

H. W., Parsons, Kansas. What we have said in our answer to J. R. R., South Lakewood, New Jersey, applies equally to your question in regard to the roundhouses

ECUADOR RAILROAD.

F. H., Salt Lake City, Utah.—The Guayaquil and Quito Railway of Ecuador, South America, is of 3 feet 6 inch gage and operates 464 kilometers, equal to about 289 miles. This road has 16 locomotives, 22 cars, and 138 wagons, 2 steamboats and 4 lighters. The superintendent of transport is F. R. Blunt, address Huigra, Ecuador. The company's new York address is 25 Broad Street

REGENERATIVE BRAKING.

J. D. S., Florence, Pennsylvania, writes: I read the article, "Electrical Era in the Rockies," in your magazine, and would like to ask a few questions in regard to braking. As I understand it, the motors acting as generators give enough resistance to hold the train back. What is the maximum weight one engine will hold back?

The subject of your question—regenerative braking as applied to electric locomotives—is one of the most interesting topics discussed in the railroad world during the past year. This feature is embodied in the electric engines of both the Chicago, Milwaukee and St. Paul and the Norfolk and Western Railroads.

In descending grades, considerable energy, or power, is ordinarily dissipated as heat at the

brake-shoes, whereas in regeneration the motors, acting as generators, not alone hold the train back, but also return power to the electrical conductor, which energy can be supplied to some other train, thus requiring less power from the main power-house than would be required without this feature.

The horse-power developed by the train rolling down a grade is converted into watts, and so the locomotive actually becomes a generator of electric power. The amount of energy available for regeneration is such that the speed of the train down the grade is under control of the operator without the use of the air-brakes, which are held in reserve for stopping the train or for emergency.

As to the maximum weight which the engine will hold back, this will depend upon the rating of the locomotive, or the speed and the weight of the load. For instance, on the Norfolk and Western the average weight of the train, exclusive of the locomotive, is 3,250 tons, the train consisting of 45 cars.

On the grade of 2.36 per cent between Coaldale and Cooper the horse-power available for regeneration may be calculated as follows:

The down-pull for each one per cent of grade according to the law of physics is 20 pounds per ton, so that on the 2.36 per cent grade there will be 47.2 pounds per ton less the friction of the train, which is about 7 pounds per ton. Therefore 40.2 pounds per ton are available, and the train of 3,250 tons and a 270-ton locomotive is equal to 3,520 tons.

Then $3,520 \times 40.2 = 141,504$ pounds.

These calculations are all based on the train operating 14 miles per hour, in which the speed per minute is 1,232 feet, so that the horse-power available for regeneration is

$141,504 \times 1,232 \div 33,000 = 5,285$ horse-power.

Disregarding the efficiency of the machine, we know that one horse-power is equal to 746 watts, the electric unit. As has been explained, regeneration is the conversion of the energy of the descending train represented in horse-power into electric power or watts, so that by providing a method for controlling the amount of electric power returned, this electrical power can be kept constant or can be varied to suit the grade which the train is descending.

EXPRESS AND MAIL REVENUES.

L. G. T., DeKalb, Illinois.—In regard to your question as to whether the railroads derive the greater revenue from the express or mail service, we quote the latest figures available, which are for the year ending June 30, 1914. These figures are for class-one and class-two roads, which will include all lines having operating revenues of over $100,000.

In the year referred to the receipts for railway mail service on these roads amounted to $55,062,001 or 1.81 per cent of the total revenues of the roads referred to. During the same period the express revenue amounted to $75,541,569 or 2.48 per cent of the total revenues.

CONSTRUCTION IN 1916

B. M. M., Shreveport, Louisiana.—During the year of 1916 only 1,098 new miles of railways were constructed in the United States, and while this was more than in the year of 1915, it was still less than for any other year since the Civil War. The following table gives the figures of new construction for each year from 1803 to 1916, inclusive.

1803	1,024	1905	4,388
1804	1,700	1906	5,623
1805	1,420	1907	5,212
1806	1,692	1908	3,214
1807	2,109	1909	3,748
1808	3,205	1910	4,122
1809	4,509	1911	3,066
1900	4,894	1912	2,997
1901	5,368	1913	3,071
1902	6,026	1914	1,532
1903	5,652	1915	933
1904	3,832	1916	1,098

LONGEST LINE IN 1916.

2. The longest continuous line built during 1016 was the Charleston Southern (Seaboard Air Line), Charleston, South Carolina, to the Georgia State line, 88 miles. The next longest was on the Chicago, Milwaukee and St. Paul, from Great Falls, Montana, to Agawam, 60 miles.

Considerable mileage in addition to the 1,098 completed, as given in the answer to your first question, was projected, and some was in the course of construction.

The Santa Fe had authorized the construction of several long branch-lines in Texas and Oklahoma; the Northern Pacific had let considerable mileage in the Northwest, and the Burlington has been authorized to begin construction on the first section of its proposed line across the State of Missouri.

These are some of a large number of projects which indicate that 1917 will be a year marked in new construction.

THE CAUSES.

3. The low figures for new construction in the two years past are attributed to a number of causes. The roads have been suffering for a number of years from acute business depression, and this has been aggravated by the operations of the various State and Federal commissions.

Other factors entering into the standstill policies of the roads, as at present, are the uncertainty of the continuation of existing freight traffic, the high price of material, taxes, and the increased cost and scarcity of labor. Late in 1915 things began looking up in the form of increased earnings, and have since been on the upward trend, so that there is a more hopeful outlook for the future.

BOTH ARE WRONG.

W. M. P., Topolobampo, Mexico.—Both yourself and your friend are wrong, as neither the New York Central nor Pennsylvania Railroads has ever had trains between New York and Chicago scheduled below 18 hours. At the present time the Twentieth Century Limited of the first-named road, and the Broadway Limited of the latter, both scheduled for 20 hours, are the fastest trains between the two cities.

LOCOMOTIVE COAL.

C. E. R., Eagle Pass, Texas. We cannot furnish you a list of the roads that use anthracite coal for locomotive fuel. Many of the roads in the East burn the smaller grades of anthracite, such as birdseye, culm, *et cetera*, a percentage of soft coal being generally mixed with the anthracite.

Bituminous coal is used on the majority of the roads. Coals for locomotive service vary according to the location of the railroads.

P. AND R. PACIFICS.

2. The Philadelphia and Reading Railway has five Pacific type locomotives. They are known as the Class G engines on this road.

STEEL TIES.

J. J. G., Highland Falls, New York. Steel railway ties are used very extensively in other countries than the United States with highly satisfactory results. For instance, in Germany fully 40 per cent of the railway track is laid with steel ties. As yet they have not made any appreciable progress in this country, due to the hitherto abundance of good, cheap timber.

The most extensive use of the steel tie in the United States is on the Bessemer and Lake Erie Railway, where several hundred thousand are in use in main track.

In regard to your other question, where track circuits are used for automatic signaling, the use of steel ties requires that insulating plates must be placed under the rails and suitable insulating washers and sleeves on the bolts. On the Bessemer and Lake Erie installations, ½-inch fiber tie-plate is used under the rail and a fiber bushing is placed between the bolts and clamps.

C., M. AND ST. P. ENGINES.

M. C. H., Childress, Texas, writes: I noticed in the Light of the Lantern of your February issue the method of locomotive classification on the Chicago, Milwaukee and St. Paul Railway. Will you explain the use of the symbol "S," and give the specifications of the A2, B4, G7, and L2/S engines? When I fired on this road, they didn't use an "S" symbol, and I never knew the size of the above engines.

The designating letter "S" used in connection with the classification method to which you refer signifies superheater engines. We are unable to give you complete specifications for the engines you mention, but the following are their respective ratings on the Walworth to Rondout Division: A2, 19,317 pounds, B4, 24,643 pounds, G7, 28,015 pounds, L2/S, 46,617 pounds.

DISTANCES.

A. J. M., Billings, Montana.—The distances between the cities and on the roads that you mention are as follows:

Oregon Short Line Railroad, Salt Lake City, Utah, to Butte, Montana, 434 miles; Western Pacific Railroad, Salt Lake City, Utah, to San Francisco, California, 927 miles; Southern Pacific Company, Portland, Oregon, to San Francisco, California, 772 miles; Great Northern Railway, Chicago, Illinois, to Seattle, Washington, 2,208 miles; Chicago, Burlington and Quincy Railroad, Kansas City, Missouri, to Chicago, Illinois, 400 miles.

RAILROAD SECRET SERVICE.

M. F. F., Erie, Pennsylvania.—The secret service, or special agents' department of a railroad as it is sometimes called, is that part of the organization to which is assigned the protection of the company's property and also that of the shippers and passengers. Where illegal practises may occur, in dealing with almost any branch of transportation companies, it is this department that generally conducts investigations.

On some roads the men engaged in this work are known as detectives, and on some of the larger systems one branch of this service includes the railroad police, some of whom actually do patrol duty. Trains containing valuable shipments, such as specie, money, *et cetera*, will be entrusted to the care of the agents of this department for protection against thieves and bandits.

It would be difficult to tell in these columns the multiplicity of duties assigned to men engaged in this branch of railroad work, a well-organized department being made up of specialists in each department of railroading.

As we stated previously, the organization varies greatly with the different roads. On some it is under the direct supervision of the president or general manager, while on others this department reports to the general superintendent.

We cannot give here any further particulars in regard to securing a position in this service. Personal application at the offices of the railroads will secure for you the other details you wish.

A PROBLEM.

J. F. K., Chicago, Illinois, writes: The following puzzle appeared in the *Chicago American*, but they have never published the answer. Will you give your opinion, to settle an argument?

> PROBLEM: A freight brakeman started on a south bound freight-train from Zion City to Waukegan. The train was a mile long. He walked the whole length of the train, arriving at the front end just as it pulled into Waukegan. The distance between the two cities is six miles, and the train was going twenty miles an hour. How far did the brakeman travel and at what speed? It is assumed that the caboose was at the Zion City station when the train started and the engine at the Waukegan station when the train stopped.

The train is traveling at the rate of 20 miles per hour, therefore it has run the 5 miles in 15 minutes. The brakeman has walked one mile in addition to the distance traversed by the train, and hence has traveled 6 miles in 15 minutes, or at the rate of 24 miles per hour.

BUSIEST STATION.

B. B., Schenectady, New York. The South Station, Boston, Massachusetts, is the busiest railway terminal in the United States. At this station there are 1,567 train movements each week-day, this figure including 385 draft movements from storage yards and about the same number of light-engine movements. The time-table for this terminal shows 817 regular trains in and out each day; as many as 90 leave and arrive in one hour.

The next busiest station is the North Station in the same city. This is the busiest terminal in the country used by the trains of one railroad.

A comparison of passengers in and out of the South Station, Boston, with the Grand Central Terminal, New York, may be of interest. The total number of passengers in and out of the South Station was 38,411,507 in one year. During the same period 22,405,295 passengers passed in and out of the Grand Central Terminal, New York, the daily average being 61,397, while the average for South Station is 105,327 daily.

BROOKLYN STATIONS.

2. As yet no trains are leaving Brooklyn, New York, direct for points west. The busiest station in this city is the Long Island Railroad Terminal at Flatbush Avenue. In 1914, 1,.301,524 passengers were handled at this station.

STANDARD CODE.

D. H., Sharon, Pennsylvania.—The book, "Standard Code of Train Rules of the American Railway Association," will be furnished by the Angus Sinclair Company, 114 Liberty Street, New York. The price is fifty cents per copy.

2. An impediment in speech, such as stammering, may prevent one from securing a position as fireman on a locomotive. However, there is no hard and fast rule in regard to such details. Provided a man meets the other requirements of the service he may be engaged.

ANOTHER PROBLEM.

A. M. L., Des Moines, Iowa. Well, old-timer! If you really want us to do so, why, we will answer your query.

If a frog jumps 3½ feet up each day and falls back 2½ feet at night, if such a thing were possible, he would gain one foot each day and would reach a height of 45 feet on the forty-fifth day. The editor of this department is rather of a serious turn of mind, and does not guarantee to answer such queries through this column in future.

A CHANCE FOR A PSYCHOLOGIST.

E. B. B., Harrison, Arkansas, writes: Will you answer the question that appeared in your February issue? "Why do the majority of accidents to British railway men occur during the second hour of the day's work?"

The majority of accidents to British railway men do not occur during the second hour of the day's work. This question was originally promulgated on account of the investigations of the British Board of Trade to ascertain what effect, if any, the number of hours of labor had to do with the number of accidents, the investigations showing that more accidents occurred in the

second hour than in any other, but a long way from a majority

The author of "Frogs" in the February number was evidently in error

Figures covering nine years show that in this period 607 accidents occurred in the first, 734 in the second, 725 in the third hour, and a constantly diminishing total until 553 occurred during the tenth hour of labor, which is recognized as a day's work, or more, in this country

The editor of this column will tackle almost anything, but as your question is not based on fact, and as he is not sufficiently informed as to the working conditions, characteristics, *et cetera*, of British railway men, he is not in a position to delve into the psychology of your question, which really should read, "Why do more accidents occur during the second hour of the day's work?" In other words, he, too, is "passing the buck"

OIL-BURNERS.

E. D, Owego, New York. There are no statistics or data available in regard to the States in which oil-burning locomotives are operating. Few roads use oil-burners exclusively, but the following figures may give the information you wish

On the first-class roads—that is, those with annual operating revenues of over $100,000—there are in service about 64,000 locomotives, of which there are over 24,000 in the Western District. That the use of the oil-burners is confined almost entirely to the Western District is indicated by the fact that of the 4,140 oil burning locomotives in the United States, 3,846 are in the Western District

A COALING DEVICE.

I. R., Franklin, Illinois.—There can be no question as to the value of a coaling device such as you describe. From the details you give, we are unable to state whether such a device is patentable or not. We can only suggest that you take the subject up with some reputable patent attorney, who will advise you in this regard

RAILWAY DIRECTORIES.

H. E. D., Nashville, Tennessee.—We do not know just what kind of a railroad guide or directory you refer to. In any event, we do not believe there is a publisher in this country that can furnish such books in regard to the railways of Australia and India

The "Universal Directory of Railway Officials," published by the Directory Publishing Company, 15 Farringdon Avenue, London, E. C., England, contains a list of all the railways of the world and their officials, and also gives particulars in regard to mileage and equipment. If the foregoing is not what you desire, we suggest that you communicate with the *Indian Railway Gazette*, 13 British Indian Street, Calcutta, India, and the Council of the Railway Institute, Wellington Street, Perth, Australia

VALVE SETTING.

F. W., Pansey, Alabama.—Space, or, rather, the lack of space, precludes us from furnishing a complete set of diagrams setting forth all the details in regard to the adjustment of the Stephenson locomotive valve-gear. A brief description is not sufficiently clear to the uninitiated, and the experienced mechanic does not require elemental lessons.

The best method is to secure a good book on the subject. The Angus Sinclair Publishing Company, 114 Liberty Street, New York, have a number of books on the subject, notably "The Valve Setter's Guide," by James Kennedy, price fifty cents, or "Link Motions," by Fred S. Colvin, price fifty cents.

TELEGRAPHY SCHOOLS.

E. A. F., Watertown, New York.—We believe telegraphy can be learned at home, as there are correspondence schools teaching by mail. The Omnigraph machine to which you refer is undoubtedly capable of sending good Morse

This machine has been adopted by several departments of the United States government, being used for the examination of applicants, as to their ability to receive, when being examined for wireless licenses

The machine is used also in a large number of schools, *et cetera*. The address of the manufacturers is Omnigraph Manufacturing Company, 39 Cortland Street, New York City.

MOST MILEAGE.

G. H. C., Grafton, West Virginia.—The New York Central system has the greatest mileage. See our answer to M. L. H., Atlanta, Georgia, in last month's issue.

STEAM.

K. M. S., Brewster, New York, writes: Assume that steam is under a high pressure entering the cylinder. Would there be an initial force exerted on the piston, due to the steam

striking it at a high velocity? I know that if such a force exists, it must be small, but want to know if it exists at all, either practically or theoretically

It is immaterial at what pressure the steam is admitted to the cylinder, there is no additional force added to its pressure either on account of its high pressure or its momentum

The elasticity of the steam precludes the possibility of any added or accumulated force such as is ascribed to the percussive force of hard substances striking each other at high velocities On the contrary, steam never sustains even its initial force

Its tortuous passage through the admission ways leading to the piston destroys some of its force, and the condensation inevitable on reaching cooler surroundings also weakens its pressure

On being released from immediate proximity to the heating forces, steam may truthfully be said to be playing a losing game all the time

THE 999 AGAIN.

A. G., San Francisco, California.—Since last issue went to press we ascertained definitely that the old "Speed Queen," the locomotive famous as the 999, of the New York Central, is now in service on the Pennsylvania Division of the New York Central, hauling trains Nos. 30 and 37 between Avis and Clearfield

Telegraphic & Telephonic

IF there is anything you want to know about the telegraph, telephone, or radio telegraphy—if you have an operating problem that puzzles you—if you want to discuss a question of theory—write the RAILROAD MAN'S MAGAZINE. We have engaged a technical expert who is one of the leading authorities of the country on these subjects. Ask him. He knows!

AVERAGE SALARIES.

H. B. A., Philadelphia, Pennsylvania.—Your inquiry was not received until January 8, and the February issue of the magazine was on that date already on the news-stands. As you failed to give your street address, we have been unable to mail you the information desired When mail replies are required, it is necessary to give your mail address and to enclose a two-cent stamp.

It is difficult to give exact figures disclosing average salaries paid telegraphers on railroads in a given section of the country. An approximate figure would be, for lines east of Chicago, $60 per month, and for lines west of Chicago, $75 per month in main-line offices

The average salary on branch lines where train service is infrequent and the duties light are somewhat lower than those stated.

PROSPECTS FOR AN OPERATOR.

THOMAS H. C., Philippine Islands. When you return to the United States, you will likely find that your services are in demand in various branches of the telegraph business. You are exceptionally well equipped to make rapid progress in whichever line you enter

If it is your intention to locate permanently in a desirable city, we would recommend that you enter the service of the Postal or Western Union companies. Certainty of advancement is greater to-day than at any time in the past for those qualified to accept responsibility

LEASED WIRE OPERATORS.

H. L. S., Boston, Massachusetts.—The International Association of Leased Wire Telegraphers was formed in June, 1910, with headquarters at 52 New Street, New York City

"SNAPPY" SOUNDERS.

C. J. M., East Las Vegas, New Mexico.—The problem you submit is a highly interesting one, the solution of which should be understood by all telegraph electricians. It is found that a telegraph relay or sounder operated in a local circuit, requiring, say, sixty milliamperes current, will operate with a more snappy action the higher the voltage employed

If it is found that six dry cells will furnish the required sixty milliamperes current, then it may be demonstrated that a 110-volt generator, or gravity-cell battery, so regulated with non-in-

ductive coil-resistance units that the current supplied will still be but sixty milliamperes, will produce a more satisfactory (or snappier) signal

The reason for this is due to the element "time constant" of the circuit

The formula for time constant is:

$$T = \frac{h \times I}{E}$$

in which h, represents inductance in henries,
I, current in amperes,
E, applied voltage

The time constant represents the time it takes the current to rise to approximately two thirds its full value.

Consider the case of an installation where 10-ohm sounders, 180-ohm resistance-coils, and 40 volts e. m. f. are employed. The current is found to be about 210 milliamperes (.210 ampere), and if the induction of the sounder-coils is 2 henries and the voltage 40, the time constant will be approximately .010 second

With an applied e. m. f. of 110 volts, 600-ohm resistance-coils, and an inductance of 2 henries, the current will be approximately 180 milliamperes (.180 ampere), and the time constant approximately .003 second Therefore, although the current strength remains almost the same, the higher voltage causes the current to reach two thirds of its maximum value in considerably less time

FAMOUS EX-TELEGRAPHERS.

W. D W., Fort Fairfield, Maine In a recent issue of the RAILROAD MAN'S MAGAZINE was published a list of about sixty names of famous ex-telegraphers, among whom might be mentioned—Andrew Carnegie, Thomas A Edison, Daniel S. Lamont, secretary of war in Cleveland's second administration; Cassius M Barnes, ex-Governor of Oklahoma; Marshall Jewell, postmaster-general in Grant's cabinet; Robert J. Wynne, postmaster-general in Roosevelt's cabinet; Guy Carleton and George Kennan, authors; Lee Mantle, ex-Senator from Montana, Rufus Bullock, ex-Governor of Georgia, and R W Sears, of Sears, Roebuck Company

THE JOHNSON COIL.

N. W B., Sacramento, California.—The "Johnson" coil is used to reduce sparking at pole-changer contact points, in duplex and quadruplex sets. The device consists of three separate windings wound on a wood bobbin. The windings are insulated from each other, and each winding is dead-ended.

The other ends of the coils are connected respectively to armature, and open and closed contact points of the pole-changer. The arrangement accomplishes the same ends as the condenser circuit sometimes provided in multiplex instrument wiring

MEANING OF "O'PIP."

G. L. M., Winnipeg, Manitoba.—The term "O'Pip" has been applied to the members of the signal corps of the British army engaged on the west front in the present European war. The word itself is the British soldier's conception of an appropriate abbreviation for the words "observation posts." Telegraph and telephone operators and linemen are known as O'Pips

B., R. AND P. RY. SCHOOL.

W. L. J., Syracuse, New York The Buffalo, Rochester and Pittsburgh Railway proposes to furnish, or already has furnished, equipment to the Weber Memorial Training School at Punxsutawney, Pennsylvania, for the purpose of training telegraph operators and train-despatchers.

W. U. EDUCATIONAL COURSES.

H. L. M., Washington, District of Columbia.—Commencing January 1, 1917, employees of the Western Union Company are provided with facilities for taking correspondence-school courses as conducted by the American School of Correspondence, Chicago. The subjects include arithmetic, letter-writing, accounting, commercial law, written English, geography, bookkeeping, salesmanship, tariff and rules, and the elements of telegraphy

BREAKS IN CABLES.

C. J. M., East Las Vegas, New Mexico.—In the submarine-cable article, which appeared in the February RAILROAD MAN'S MAGAZINE, it was stated that expert cable electricians can locate within a half-mile the point at which a cable is broken. In this instance the word "expert" implies a thorough knowledge of the per-mile characteristics of the broken cable and long experience in locating submarine-cable faults.

The conditions existing when a break occurs in salt water are different from those encountered in testing aerial or underground cables. When the zinc pole of the battery is connected with the cable, the conductor will be coated with hydrogen and the iron armor wires with oxygen, the resulting polarization creates a current in the cable

Therefore, if the conductor, the sheath, and a galvanometer are connected in series without

regular battery, the galvanometer needle will indicate current flow If the connections are reversed, the needle will be deflected in the opposite direction.

This means that tests for distance must be quickly made, alternately with positive and negative battery applied at the testing station, taking advantage of the periods of short duration when polarization is not complete

The Wheatstone bridge is employed in making the resistance measurement, tests being made from each end of the broken cable. When the distant earth contact is of negligible resistance, the conductor resistance to the fault is measured and called "r." The total conductor resistance from terminal to terminal is called "R" The distance in feet to the fault is

$$\frac{r \times l}{R}$$

"l" representing the total length in feet

The conductor resistance may also be determined by connecting a four-volt battery in series with the galvanometer, shunted by a low resistance. The battery-poles are reversed three or four times and mean readings taken.

Then the cable conductor is replaced in the test circuit by an adjustable rheostat, and identical readings secured. The cable-conductor resistance is then easily calculated

In those instances when the distant earth contact is of comparatively high resistance, Blavier's method is employed

Perhaps the best work on submarine cable-testing is Kempe's hand-book on electrical testing. Another, although somewhat older, work on the subject is "Electric Testing of Telegraph Cables," by Captain V. Hoskier

BRITISH RAILROADS

J. H. H., Mason City, Iowa – In Great Britain the Continental Code is employed in all telegraph operation. Morse telegraphers should be able to learn within a few weeks how to send and receive by means of this code

TELEGRAPH STUDENT.

E. K., Deposit, New York.—We do not know of any telegraph school in the neighborhood of Clifton, New Jersey, but we can make two suggestions for your benefit

If there is a Western Union office in Clifton, in addition to the depot office, write to Mr. T. W. Carroll, General Manager, Western Union Telegraph Company, 195 Broadway, New York City, asking him to authorize the manager at Clifton to permit you to "finish up" in that office. If you can arrange this, very likely the Western Union would provide a place for you as soon as you are competent

The Postal Company maintains a class for students in New York City from which regular appointments are made as soon as students are able to hold positions satisfactorily. You could arrange to enter this class by writing to Mr J J Whelan, Manager, 253 Broadway, New York City.

ORIGIN OF O'S.

R. M L., Halifax, Nova Scotia.—The symbol O'S was first used on the Buffalo and Erie Railroad in the year 1855, being introduced by Superintendent I. A Bush. At first the signal was used as a general call for all stations.

Shortly after the signal became established, Mr Bush also introduced the system of numbering trains, instead of identifying a train as the "Lightning Express," the "Cincinnati Express," *et cetera*, and the symbol O'S was then extended to mean "train report"

SIZE OF WESTERN UNION.

L. W. H., Atlanta, Georgia.—At the present time the Western Union Telegraph Company has 210,000 miles of pole-line, 1,581,571 miles of line-wire, 26,000 offices. It employs about forty thousand people

MAIN-LINE SOUNDERS.

H. I. M Richmond, Virginia Main line sounders wound to 150 or 200 ohms resistance may be employed satisfactorily on lines which are at all times maintained at a high standard of insulation. During wet weather, or in the summer months when foliage is heavy along a pole-line, current leakage sometimes is so great that it is necessary to employ relays, the relays in turn to operate sounders supplied with current from local batteries

The present high cost of gravity battery materials has resulted in a large increase in the number of dry cells used for local-battery purposes, but these latter cells have a short life where the circuits which they feed are closed much of the time

A very good battery-economizing scheme, where dry cells are used, is to interconnect the relay and sounder by means of a six point switch, so that when line conditions are favorable, the sounder is connected directly in the line, and when wet weather prevails, or when the line-current is varying considerably in strength from any cause, the relay is connected in the main-line circuit; the relay operating the 150-ohm sounder locally from dry cells

If this plan is used, the dry cells will be in

service only occasionally, and as a result will have a life of several months instead of as many weeks.

O. S. AND S. O. S.

L. G. T., De Kalb, Illinois.—See answer to R. M. L., in this issue. The letters forming the symbol OS individually have no particular significance. When the signal was first used, it is probable that the "S" part of the combination was selected because it was the first letter of the word "stations."

On the circuit on which the symbol was first used there may have been an office call "AS" or "SA," so that instead of employing AS to call "all stations," it was decided to use a signal not already assigned, therefore OS.

A somewhat similar circumstance accounts for the use of "OK" to signify "all correct." There is a well-authenticated story to the effect that during the earlier days of telegraphy a supply-depot representative of the United States government chalked the words "Oll Korrect" on boxes and bales which he found to check up satisfactorily with invoices. Later this was abbreviated to OK, so that this good man's bad spelling gave to the world a symbol which has had universal application.

The symbol "S. O. S." is used as a distress signal by ships at sea in signaling by radio telegraphy. Individually, the letters forming this symbol have no accepted meaning.

IMPROVING RADIO SIGNALS.

W. M. T., Newburgh, New York.—After checking the radio receiving-circuit diagram which you submit, the points at which we would look for trouble are the condenser (No. 3) and the condenser (No. 4), also the make-up of the loose coupler. It is possible that the capacity of the home-made fixed condenser is not what it should be.

Have you tried receiving signals without that condenser connected in circuit? There may be a defect in the variable condenser.

If you have a buzzer for testing purposes, by operating it while you alter the capacity of the variable condenser, you should be able to determine whether or not that condenser is all right.

It is possible also that the air space between the primary and secondary windings of the loose coupler is too great. You might try the circuit with Arlington signals, using only the loading coil, with the loose coupler eliminated.

Let us know how you make out.

SEND US A SAMPLE OF YOUR "OPR'S FIST."

THE special article entitled "Operator's Fist," which appeared in the October, 1916, issue, brought forth a considerable amount of commendation, but it is quite possible that none of the specimens of operators' handwriting therein presented equaled in neatness the penmanship of some of our readers.

This is a subject in which all good railroad operators have always taken a great deal of interest; and in order to reopen the subject, the editor will be glad to receive specimens of the penmanship of present-day operators.

If enough *good* samples are received to warrant it, we will select those which in our judgment are the first, second, third, fourth, and fifth best specimens, and publish them in an early issue. The five winners of the contest will each receive a prize in the form of a year's subscription to the RAILROAD MAN'S MAGAZINE.

In the interest of fairness, it may be best for each contributor to write the same lines, in order that the same letters and word arrangements will be used.

We submit the following as the text to be used:

> This is a specimen of telegraphers' penmanship submitted to the editor of the Telegraph and Telephone Department of the RAILROAD MAN'S MAGAZINE in the year nineteen hundred and seventeen.

Use black ink and a good grade of white, unlined paper. Write your name and address on the reverse side of the same sheet of paper.

Address, EDITOR, RAILROAD MAN'S MAGAZINE, 8 West 40th Street, New York.

THROUGH THE CAR-WINDOW.

"POINT OF ROCKS," NEAR PRESCOTT, ARIZONA—HUGE VOLCANIC ROCK-PILLARS ALONG THE SANTA FE LINE—PILLARS ARE BLACK OR BROWN, TIPPED WITH VERMILION, WITH DEEP PURPLES IN THE SHADED SIDES

WHEN the eye of the passenger beholds some of the scenery encountered along the line of the Santa Fe in western and southern Arizona, particularly in the vicinity of the Grand Cañon, he may no longer doubt the stupendous power and the grandeur of the unseen elements of nature.

Witness here just a fleeting glimpse of the wonderful works left by the rock-torturing volcanoes of another age, a mountain of uptilted rock pillars—some of them as symmetrical as church spires—and tremendous boulders lying shoulder to shoulder as if placed by the hands of skilled masons.

Surely the anguished demon of fire in the earth must have given off his final desperate death gasp when he flung to the surface of the earth this mighty mass of molten rock, now forming one of the most peculiar terraced formations to be seen in a country that abounds with evidences of the volcanic forces.

The path of the railroad is directly through these ancient lava-beds, as well as daringly along the sheer faces of forbidding cliffs—a route that has called up some pretty engineering problems.

The rock pillars are black or brown, tipped with vermilion, with deep purples in the shaded sides—colors that have been caught from centuries of sunshine.

The particular patch of volcanic refuse shown in the engraving herewith is located near Cedar Glade, not far from the 650 foot steel bridge that spans Hell Cañon, 170 feet above the dry stream bed. It is known as "Point of Rocks." Prescott, Arizona, is the nearest community of importance.

There is no more grandly picturesque scenery on the route of any railroad of the world than in this section.

BRITISH RAIL SERVICE HIT.

War Has Added to Cost of Travel and Reduced Number of Trains, but the People Cheerfully Submit.

BY CHARLES STIRRUP.

RAILWAY traveling in Great Britain has been adjusted without compromise to the stern necessities of a whole nation at war. One by one most of the facilities, luxuries, and economies that in the happy days of peace made personal transit from town to town a more or less swift, cheap, and pleasant undertaking, have been withdrawn, and now no one journeys by train unless obliged to do so.

Right from the outbreak of war, when the government took over the entire control of the railways of the country, the public have had it made clear to them that even their collective convenience is in all respects subordinate to military requirements. A less frequent, comfortable, and reliable service, and a decidedly slower one, has been patiently, even willingly endured for thirty months, and there does not appear to have been any general grumbling at the serious matter of an increase of fifty per cent on the minimum fare that went into effect on New Year's Day.

Fifty Per Cent Increase in Fares.

Fares have been increased, not for revenue, but solely to reduce passenger traffic. That is the government's one object. The demands on the railways by the War Office and the Ministry of Munitions are continuously growing, and are expected to assume unprecedented dimensions within the next few months.

Every railway employee who can be spared has been released for military, naval, or munition-making service, and the curtailed staffs have to work desperately hard to cope with present traffic. As freight of a war character increases, then obviously passenger traffic must be decreased correspondingly, and one way of effecting this is to make fares practically prohibitive to all but the rich and the well-to-do.

Three Cents for Third Class.

Ninety per cent of the British public travel third-class, for which the fare has hitherto been the equivalent of two cents a mile. It is now three cents.

Allowing for the difference between British and American wages and salaries, three cents a mile is as serious a matter in England as five or six cents would be in the United States. Still, all who must travel by rail will pay the increased fare demanded with cheerful acceptance of the situation.

Workmen's fares—which are extremely cheap—and contract, commuters', traders', and zone tickets are not affected by the new conditions, nor is any increase in the charges on freight contemplated. Commercial travelers are, however, hit hard, and the Board of Trade has promised to consider concessions to them.

Women who reside in the outskirts of large cities and are accustomed to relieve the humdrum monotony of suburban life with frequent afternoon visits to the shop-

ping and pleasure sections, must pay extra fare or travel by street-car if there is a service available.

The cheap excursion fares that had become so popular a feature of the British railway service were, of course, swept out of existence in the earliest days of the war.

Every company in the country formerly issued cheap tickets to meet a multitude of demands and to create new business. There were half-day, day, week-end, weekly, ten-day, two-week, and monthly facilities—to the seacoast and rural resorts, in connection with football and cricket games, to attend concerts and theaters in the great cities, to visit the old folks at home at Christmas and other holiday seasons.

Cheap Excursions Gone.

The popularity of the largest seaside resort in Europe—Blackpool, situated on the Lancashire coast and within easy distance of many of the great industrial communities of the country—was created and maintained by cheap excursion traffic. Fares varied from about fifty-five per cent of the ordinary—this for weekly or longer-timed tickets—to such marvels of cheapness as three shillings (seventy-five cents) for a total distance of more than three hundred miles.

In the early days of excursions anything was considered good enough for the "cheap trippers." No rolling-stock was too out-of-date for them; no rate of traveling was too slow.

But the companies were not long in discovering the folly of such ideas. Excursion traffic was found to be very valuable, and the wants of the public that made it became so sedulously cultivated that the best equipped coaches and the highest-speed locomotives were provided in return for the much reduced fare. There are, with rare exceptions, no excursion-trains nowadays in Great Britain. They have been sacrificed to the exigencies of war.

The most recent Railway Orders Under the Defense of the Realm Act have closed a considerable number of suburban stations and very considerably curtailed the passenger service on many systems. On the London, Brighton, and South Coast road two hundred and thirty trains were withdrawn on January 1, and since then others have disappeared from the timetable

At the same time two hundred trains on the Lancashire and Yorkshire Railway lines were canceled, and further reductions have been made from time to time. Each of the systems named, especially the Lancashire and Yorkshire, covers a small but thickly populated territory with a network of lines over which a very heavy traffic is run.

The train withdrawals are, therefore, not so sweeping as would appear without explanation, but must be causing inconvenience to a large number of people.

The withdrawal of some of the trunk-line trains has meant a reduction in the average speed of passenger traffic on such roads. There are fewer fast expresses that run without stop between large cities.

Curtailed Express Traffic.

In no other country in the world had traffic of this kind become so highly developed as in Great Britain before the war. There were ninety trains a day that ran one hundred miles or more without stop at a speed of fifty-five or more miles an hour. At the same time there were only five such trains in France, and none at all in either Germany or the United States.

The British system on trunk-lines was to alternate long-distance non-stop traffic with trains making more or less frequent stops. Passengers from London to Manchester (186 miles), for instance, could travel by trains that called nowhere before reaching Crewe (158 miles) or Stockport (177 miles).

Runs between the capital and Plymouth (246 miles), Leeds (196 miles), Liverpool (192 miles), Sheffield (165 miles), Nottingham (123½ miles), Bristol (119 miles), Birmingham (113 miles), and

many other places were made without a break at high speed.

A considerable percentage of these trains have been withdrawn, and the business man in a hurry has to possess his soul in patience as his only available means of transit pulls up at one town after another which in pre-war days he was accustomed to going through at sixty miles an hour.

Luncheon Basket Displaces Dining-Car.

Reduced speed is, however, not the only inconvenience which the British railway traveler must now endure after boarding the train. He is usually denied such pleasure and comfort as a dining-car affords, service of that kind having been largely withdrawn some months ago, chiefly in order to release the kitchen and waiting staffs for war work.

This is indeed a hardship to the man making a journey of some hours' duration. *Table d'hôte* breakfast at two shillings, luncheon at two and sixpence, and dinner at three and sixpence were usually well-cooked, wholesome, and well-served meals, though not quite up to the standard found on American trains.

Their loss is all the more deplored because of the two alternatives—one being a few minutes' scramble for food in the refreshment-room of a station where a short stop is made, and the other the luncheon-basket, which is again, as in years long past, one of the horrors of British railway travel.

The contents of this provision against the pangs of hunger never vary, except the liquid, for travelers are given a choice of beer or claret. For the rest there is a cut of cold chicken, a chunk of bread, butter, and cheese, a little fruit, together with condiments, cutlery, a glass, and a napkin. You place the basket on your knees and do your best to get value for the three shillings paid.

There was not much in the way of wasteful competition to be eliminated when the government found it necessary to take over the railways and organize them in accordance with the military requirements of the nation. This had been done not long previously, when several competing companies came to an understanding and withdrew a number of trains that were scheduled for no other reason than the supposed necessity of fighting a rival

The public lost nothing through a friendly division of traffic; the shareholders gained, and one of the best principles of economic management was demonstrated. Perhaps the fact that there had long been a magnificent service maintained between London and Bristol by a monopoly company helped to end some of the worst features of competition.

No Unnecessary Trains.

However that may be, and whatever wasteful rivalry may have existed in July, 1914, it can be taken as certain that there is no unnecessary train being worked in Great Britain now.

To grumble is the Englishman's traditional privilege, but he has complained very little indeed about the many inconveniences and discomforts of railway traveling made necessary by war. On the contrary, he has most cheerfully accepted every order issued by the government, knowing that the restrictions are only temporary, and consoling himself with the thought that each hardship and added expense is a small addition to his "bit."

The General Passenger Agent Says:

A STRAIGHT LINE is the shortest distance between stations, as only railroad map draftsmen know.

FROM THE RAILROAD MAN'S MAGAZINE

With *the* Inventors

A MONTH has rolled around since last we chatted with you, and some of you have profited by the lapse of time—many of you, in fact. We cannot notice all the meritorious expenditures of energy within the realm of railroad invention; we can only point out typical cases and ask those interested to consult their patent attorneys and find out the many avenues of thought that have led to fame and fortune.

There is no country in the world where such a flood of invention pours forth as in the United States. No doubt many of these inventions are worthless. That can be granted without argument.

Some patents lack value on account of the insufficiency of the claims or other defect in the specifications. Some inventions are intrinsically of little use because the inventors themselves are not equal to the self imposed task of scientific research. There will be always those who follow in the rear, otherwise nobody could be ahead. In this fact there is consolation.

Not all of the ideas upon the pages of the patent records are our own. We welcome inventions from abroad that find their way to our ever hospitable shores, and many come to us day by day and month by month. In the great cause there is room for all of us, and some to spare.

Among the recent inventions we note particularly the improvements in train-stops. They will continue to improve, and will eventually decrease accidents ninety per cent.

The automatic switch will come more to the front, some think, and it may not be unusual in the near future for an engineer to press a lever and open a switch ahead to take a siding.

Some practical railroad men say that the brakes should apply to the rails and not to the wheels. Braking the wheels causes the train to slide and makes flat places on the wheel-treads. There is the chance for you inventors to change the whole system of braking, but you will have to prove your point and demonstrate the value of your invention.

The wireless telegraph will undoubtedly play an important part in future railroading. There are great possibilities there, and the mind is almost dazzled at the contemplation.

Then there is the problem of systematizing the engineman's work—of making it more automatic. It doesn't do to impose too many duties on the man who has your life in his hands. There has been too much of that in the past.

We have let enough cats out of the bag for this time. You inventors will be in a wild scramble for them if we don't stop.

THE AUTOMATIC SWITCH.

TO any one unacquainted with the up-to-date railroad inventions, there would seem to be something mysterious about a train taking a siding where apparently no one throws the switch, and the plot would thicken if the train following took the straight track, equally unaided.

This very thing occurs daily, however, and the practise is extending. Even the old man who diverts the trolley-car to the right hand or to the left in our city streets will soon lay down his crowbar and go where the good traffic managers go, and his place will not be filled.

An automatic system such as we have in mind could be explained by supposing suitable cords to extend along the track, from the switch to a lever, in such a manner that a projection on a passing train would strike the lever and throw

the switch. The train following might have a projecting part set in such a position that it would strike another lever and throw the switch back again.

This explanation would not be far afield. In fact, this general idea has been specially applied in patent No. 1,200,081, issued to Frank Bida, of Thurber, Texas.

REGISTERS PASSING TRAIN

PATENT No. 1,213,066, granted to C. L. Bopp, of Waterloo, Iowa, provides means for registering at a station the number of a passing train. The name of the station is also indicated and the number of the next train, which information is automatically telegraphed to other points.

Use is made of a wireless outfit on the locomotive to close local circuits at the station. The station-agent sees the number of the passing train on a registering device and also the number of the train following. This register is operated automatically every time a train passes, and a complete record is thus made during the automatic transmission.

HEAVY HAULING LOCOMOTIVES

TWO inventors think that they have designed a locomotive with the maximum tractive force obtainable from the four-cylinder, rigid base type. The number of the patent is 1,208,078, issued to H. F. Ball, of Bronxville, New York, and H. R. Stafford, of Plainfield, New Jersey.

As the length of a rigid wheel-base is limited by the curves in a railroad, the inventors have provided for lateral play in the front and rear axles by using journals designed for side motion. This feature, although important, is not covered by the present patent, but is included in patent No. 1,181,194, granted to W. E. Woodward and S. S. Riegel, May 2, 1916. Any journal of similar design, however, would answer the purpose.

The construction makes possible a rigidly-seated boiler and the use of steam-pipes without flexible joints, as well as a frame that is not articulated.

The engine is run preferably compounded. In the illustration the small or high-pressure cylinders are shown in the rear, although they may be at the front without departing from the spirit of the invention.

The driving wheels are in two sets of six each, those in front being driven by the low pressure cylinders, and those in the rear by the high. The two sets may be connected by side rods, if desired, as shown in the lower diagram.

OIL ON THE CURVE.

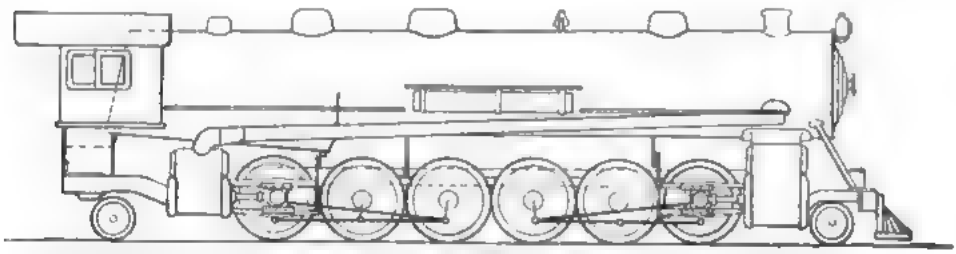
IF is not always convenient to grease a curve that is far out on the road, near no station, and yet there can be no doubt that oil or grease at such points adds to the life of the rail.

An invention by C. H. Epple, of Oakland, California, and G. A. White, of Red Bluff, California, accomplishes the purpose, it is said, and in a satisfactory manner.

The apparatus includes an oil receptacle, an air reservoir, and a local electric circuit, closed by the impact of a passing train.

The air is used to produce an atomizing effect upon the oil and spray the rail. Only the outer rail is sprayed, where it is ground by the wheel-flange under the centrifugal influence of the train as it rounds the curve. The oil is applied at the point where a train enters the curve, no matter from which direction.

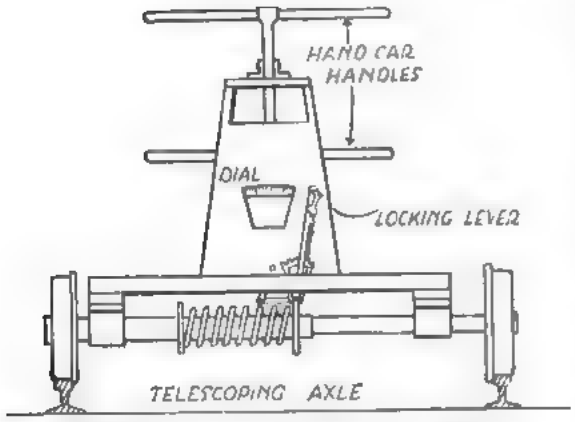
The patent number is 1,211,424.



LOCOMOTIVE DESIGNED TO EXERT THE MAXIMUM TRACTIVE FORCE OBTAINABLE FROM THE FOUR-CYLINDER RIGID-BASE TYPE. CONSTRUCTION MAKES POSSIBLE A RIGIDLY SEATED BOILER AND THE USE OF STEAM-PIPES WITHOUT FLEXIBLE JOINTS, AS WELL AS A FRAME THAT IS NOT ARTICULATED

INDICATES SPREAD RAILS.

A HAND-CAR for indicating spread rails has been patented by A. J. Lamarre, of Pawtucket, Rhode Island. The patent number is 1,212,073. One axle consists of two telescoping sections forced apart by a coiled expansive spring, the wheels being rotatably mounted on the axle, which need not turn.



HAND-CAR INDICATES SPREAD RAILS BY MEANS OF A TELESCOPING AXLE CONNECTED WITH A LINK WHICH COMMUNICATES ANY EXPANDING MOVEMENT TO A POINTER ON A DIAL

As the axle sections extend, where there is a spread in the track, a suitable link communicates the movement to a pointer on a dial.

A locking lever renders the axle non-expansive when not being used for testing purposes.

With a track-gage of this nature, a great many miles of railway can be examined in a day. If desired, a truck instead of a hand-car could be thus equipped and attached to a train.

The movements of the pointer could be automatically recorded on a ribbon or roll of paper, and complete daily records of a railway obtained at very little expense.

TRAIN-STOP.

PATENT No. 1,207,515 relates to an automatic train-stopping device comprising a train-control valve operated by a dwarf semaphore near the track.

The invention is the work of two Englishmen, J. L. Duggan and J. D. Maynard, residents of New London, Connecticut.

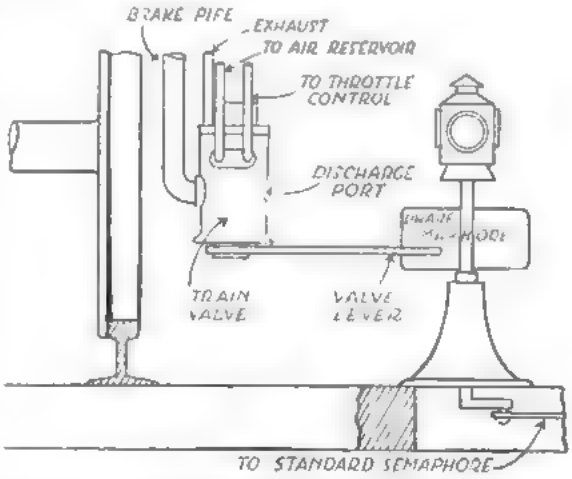
"It is our purpose," the inventors say, "to provide train stopping apparatus whereby in the event of a train passing a danger-signal or entering a danger zone, the brakes will be applied, the propelling power of the train cut off, the tracks sanded to facilitate the action of the brakes, and numerous other functions performed, the effect being to bring the train to a standstill and advise the train-crew of prevailing conditions."

When the lever of the train-valve is moved to the operative position by coming into contact with the dwarf semaphore-arm, the brake-pipe is connected with the discharge port, allowing air to escape from the brake cylinder and causing the brakes to operate. At the same time the air reservoir is connected through the valve with the pipe to the throttle control, thus shutting off the steam.

This throttle control may consist of any suitable form of motor, and in addition to operating the throttle may also perform other functions, such as regulating the steam-heating system or actuating the brake-valve.

From the throttle-control pipe is a branch pipe leading to the sand dome, to facilitate the feeding of sand to the track at the proper moment. A signal whistle may also be connected with the throttle-control pipe.

The dwarf semaphore is usually geared to a standard semaphore, and operates in conjunction with it.



AUTOMATIC TRAIN-STOPPING INVENTION COMPRISES A TRAIN-CONTROL VALVE OPERATED BY A DWARF SEMAPHORE.

POWER FOR REVERSE GEAR.

IN many locomotives, especially of the larger type, considerable force is required to operate the reversing mechanism.

Either steam or compressed air may be used for this purpose with apparatus described in patent specifications 1,208,550, taken out by H. Helmholtz and C. C. Bertram, of Chicago.

The device comprises two cylinders with a single piston-rod running through both, steam or air being admitted to the one or the other, according to the direction in which the reversing gear is to be shifted.

The piston does not transmit its motion di-

rectly to the reversing lever, but acts through an intermediate mechanism which is practically a self locking device and a guard against accidental movement. In this connection a helical slot in the piston-rod is made use of to rotate a concentric worm that meshes with a gear segment

There are steam and exhaust ports, controlled by suitable valves, for operating the piston

STOKING APPARATUS.

IN this device an endless belt with cleats on it transfers the fuel from the tender to the hopper, where two rams force it into two retorts within the firebox

Between the retorts and also next to the adjacent walls, is a mechanism for receiving clinkers and ash and moving them forward toward a discharge outlet, where is situated an oscillating shelf or shaker and a cutter or clinker-breaker

The floor of the tender is inclined so that the fuel will roll by gravity into the conveyer, eliminating the shoveling process

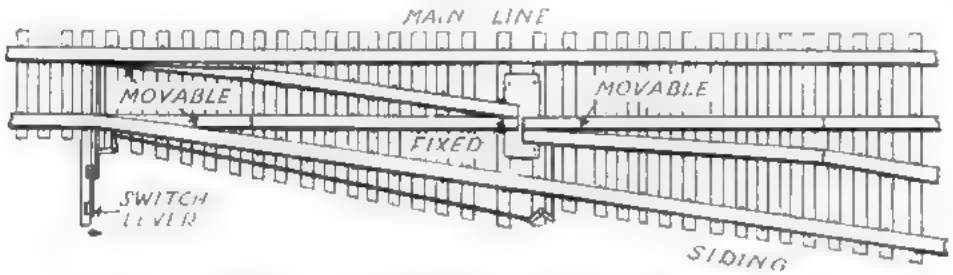
At the rear of the tender are blowers, discharging air into a common flue leading to the combustion chamber. The blower engines are run by steam from the locomotive boiler, which also supplies the motive-power for the conveyer, the rams, and the clinker mechanism

Regulation is such that the apparatus operates at full capacity when the locomotive is running at full speed, but shuts down almost completely when the locomotive stops. This is accomplished by suitable connections with the throttle lever

The patent, which is No. 1,211,591, is assigned by W J Kenney, of Wilmette, Illinois, and H. P. Grohn, of Chicago, to the Underfeed Stoker Company of Chicago

SWITCH WITHOUT FROGS.

THE primary object of the improved railroad switch, patent No. 1,207,032, invented by Theodore Hardens, of Lonaconing, Maryland, is to provide a switching device that will make unnecessary the use of frogs. The design is intended to be applicable to existing track structures, and ties of the usual form and construction can be used, with the customary spacing



SWITCHING DEVICE THAT RENDERS UNNECESSARY THE USE OF FROGS SWITCH-LEVER SHIFTS THE MOVABLE PARTS

A reference to the illustration will make plain the chief features of the track arrangement, which shows the main line clear for traffic

It can be readily seen that shifting the movable portions will open the siding

The parts are shifted by the one switch-lever which communicates its motion by means of the rods and bell cranks indicated

THE ASSISTANT TO THE RECEIVER SAYS

ROBINSON CRUSOE'S principal reason for being happy was the absence from his island of the Interstate Commerce Commission.

FROM THE RAILROAD MAN'S MAGAZINE

CUTTING THE FREIGHT-CLAIMS.

Roads Saved Over $7,500,000 in One Year by Inducing Employees to Follow Better Methods of Handling, Loading and Stowing.

FRISCO PIONEERED THE MOVEMENT.

E. D. Levy, Then Superintendent of Transportation of the St. Louis and San Francisco, Blazed the Way and G. E. Whitelam Went Him Several Better—Minor Practical Hints Prevent Loss in Myriad Directions.

BY CHARLES FREDERICK CARTER.

If the boss came to you and asked you, as a personal favor, to save five dollars for him in the course of the year, what would you say?

That identical request was presented to the men of the Frisco system some time ago, and with one accord they replied:

"Certainly, old man! With the greatest of pleasure! But while we are about it we may as well make it ten dollars apiece. That will be easier for the auditor to count."

Saved the Frisco $10 Each a Year.

Furthermore, the answer was given, not in words, but in deeds, which are said to speak louder than words. The whole bunch went at it as if a chance to save five dollars for the company were just what they had been waiting for all these years.

The five dollars apiece was saved in six months; and it was such easy money that they all went ahead and made it ten dollars each, with a few cents over for good measure, by the end of the year.

How?

Oh, by cutting down freight-claims!

Seeing what the Frisco folk had done filled other railroad managements with envy. Without loss of time they called upon their employees to get busy and show the Frisco people the real thing in claim-cutting.

It was not long until the whole nation was in the throes of a campaign to cut out the freight-claims. Even the American Railway Association, that august organization composed of the higher officers exclusively, has not merely endorsed the movement, but has taken an active part in its direction through a committee on packing, marking, and handling freight.

Results have been commensurate with the attention bestowed upon the subject; for, according to the latest report, in 1915 the principal railroads reduced their payments for loss of and damage to freight

by $7,626,519 as compared with 1914, a decrease of 23.9 per cent. These figures apply to about 215,000 miles of railway, or five-sixths of the total railway mileage in the United States.

Carrier Responsible for Freight.

You see, when a railroad accepts a shipment of freight it is responsible for its safe delivery at destination. If the shipment is lost or damaged, the consignee files a claim for full value or actual damage, as the case may be, and in due time this is paid by the company. If the shipment has passed over two or more lines the loss is prorated among them.

Legally, of course, there were certain conditions, duly set forth in the bill-of-lading, under which the railroads were not liable for loss or damage to freight; but more than a year ago Congress enacted a law making common carriers liable for full value of lost or damaged freight regardless of any agreement limiting the amount recoverable. The liability of the carrier extended clear through to destination, even when that destination happened to be in an adjacent foreign country

Furthermore, the railroads in recent years have been putting a progressively liberal construction in favor of the shipper upon all claims for loss of or damage to freight as a matter of policy. It was deemed better to pay an unjust claim than to incur the ill-will of the shipper

Many Fake Claims Presented

Unscrupulous people have not been slow to take advantage of this railroad policy. The collection of fraudulent freight-claims is quite an industry.

And in all the principal cities there are bureaus whose business it is to collect freight-claims against railroads. Some of these are downright crooked and the others are superfluous, for they can do nothing for the shipper that he cannot do for himself.

Taking all the circumstances into consideration, it is not surprising that the sums paid out in settlement of freight-claims have doubled in a decade. In 1904 the railroads paid out $17,002,602 in freight-claims. By 1914 the total had swollen to $33,671,219, which was 1.597 per cent of their gross freight revenue

The railroads of Great Britain pay in settling freight-claims .68 of 1 per cent of their gross revenues or considerably less than half what the American railroads pay

The freight-claim agents formed a national organization twenty-seven years ago which has grown until it represents all the railroads in the country. Like all other railroad organizations it has a number of committees in a perpetual struggle with the problems that perplex its members, and it also arbitrates some of the more intricate and important claims.

Huge Losses by Theft.

An analysis of the freight loss and damage account of the railroads by the Interstate Commerce Commission reveals some interesting features. For instance, the amazing fact is shown that $1,943,409 worth of freight was stolen in 1914 while in transit. Now you can understand why all the principal roads maintain large forces of watchmen, police, and detectives.

Clothing, dry goods, and notions seem to be the most attractive booty for the railroad robbers, the total value of such goods taken being $666,559. Boots and shoes rank second at $303,718. Of cigars and tobacco there were stolen $139,536 worth, and of whisky and other liquors $133,199 worth

One can understand the stealing of such things, for they are more or less valuable and not too bulky to inconvenience a cautious thief. But what is to be said of the theft of products of cement, clay, and stone to the value of $3,108?

You have heard of men who would steal a red hot stove, haven't you? The Interstate Commerce Commission says nothing about the temperature of stolen stoves, but it does assert that such ar-

ticles to the value of $2,198 were abstracted from railroads while in transit in 1914.

The tireless thieves contrived to steal from the railroads while in transit, cotton worth $4,973; new furniture worth $7,242; live stock worth $1,820; agricultural implements worth $6,035; and vehicles valued at $34,273.

But the palm is deserved by the robbers who got away with $10,761 worth of iron and steel castings and bars. The larceny of such chattels requires gifts approaching the genius displayed by Mercury, the god of thieves, himself.

Grain stood first in the list of articles for which the railroads had to pay loss and damage claims, due chiefly to defective equipment. Fresh fruits and vegetables were second on the list, live-stock third, and clothing, dry goods and notions fourth.

Freight valued at $[illegible], was destroyed in wrecks and paid for by the

G. E. ("SAVE A-FREIGHT CLAIM") WHITELAM

HIS TACTFUL CAMPAIGN OF EDUCATION AMONG THE FRISCO'S EMPLOYEES RESULTED IN SAVING THE SYSTEM $200,000 IN ONE YEAR

railroads. Fires destroyed freight worth $790,256, and defective equipment was responsible for further loss of freight worth $3,506,545.

This leaves upward of twenty-seven million dollars in freight-claims paid not accounted for in the foregoing. Given so large a sum, nearly every man on a railroad has a chance to cut out something, and that is precisely what the managements, led by the Frisco, have found out.

Employees' Errors Cost Millions.

For instance, according to the Interstate Commerce Commission's analysis, errors of employees were responsible for $1,019,136 of the freight-claims paid. That is, shipping-clerks, truckers, stowers or inspectors put freight in the wrong car, or made some other bull that could not be corrected, or trainmen carried freight by its station and failed to return it, or something of the sort.

Delays cost the railroads $2,187,345 in freight-claims. Some delays are unavoidable, of course; but there are others that need not happen if every man is on the job every minute. At least, there is an ample margin to "Save a Freight-Claim." Delays are the chief cause of damage-claims for live-stock shipments.

Improper handling, loading, and stowing of freight caused a loss of $1,346,061; and this the managements put straight up to the freight-house forces.

Rough handling of cars in the yard or on the road was responsible for a loss of $4,343,481. At first glance it might seem as if a hundred per cent of this amount might be attributed to the yard and train and engine men; but it is a fact conceded by officials that in some instances the railroads have skimped on switch-engines to such an extent that the men simply cannot handle cars properly in the yards. To get their work done they have to slam 'em around a little.

However, all this is Interstate Commerce Commission stuff. In starting the Save a Freight-Claim movement the Frisco folk did not attempt to apportion the blame. They did not even blame anybody for anything. They simply said:

"We are paying out too much money in freight-claims. Let us all pull together and see if by good teamwork we cannot reduce the total."

The Save a Freight-Claim movement was originated by E. D. Levy, then superintendent of transportation of the St. Louis and San Francisco, in the latter part of 1908, and put in effect January 1, 1909, on that road.

At that time the Frisco handled freight-claims the same as all other American railroads; that is, through the traffic or accounting departments. Levy started out with the fundamental theory that this was the wrong way to go about it.

He maintained that freight-claims arose from a failure of transportation, and hence the transportation department was responsible. It was up to the transportation department, therefore, to apply the remedy.

It should be explained here that the old way of handling claims for loss of or damage to freight was the cause of a great deal of dissatisfaction among shippers. If a shipment was lost the consignor notified the local agent of the fact, and the agent sent the claim to the freight-claim office.

Methods Got Claimants Sore.

This office gave the claim a number and file and returned it to the agent for a record of the shipment. The agent might or might not give a complete record; if he did not the papers came back to him. Then it went to the claim office again to await its turn to be shoved out into the ring to go its weary round.

Tracers and claims were so numerous that many agents could not and some would not give them the attention they deserved, but got the papers off their hands the quickest and easiest way, with the result that a tracer often passed the freight it was sent to find and returned to the claim office to start out again on another fruitless round.

The shippers lost their tempers and gave the freight solicitors for that road a frigid reception the next time they came around. If there was a competing line within reach it was pretty sure to get that claimant's business until it had the misfortune to lose a shipment for him.

Superintendent Levy determined to make a clean sweep of the whole claim business. So he organized in his own office a lost and damaged freight bureau to investigate loss, delay, and damage to freight so promptly that all the facts would be available before a claim was presented, and to locate and remove the cause and prevent a recurrence of the difficulty. With an organization of thirty employees, including junior clerks and the office-boy, at an expense of $32,940, he saved the company $153,659 the first year.

That was doing very well for a first assault on a system that had become ossified from immemorial usage, but the Levy idea did not get at the root of the matter. That was left for G. E. Whitelam, superintendent of freight loss and damage claims of the Frisco, to do

Whitelam's Campaign of Education.

Whitelam convinced himself and his superior officers that everything possible had been done to refine the machinery for handling freight-claims. Such claims were handled very promptly, frauds were kept down to an irreducible minimum, and the shippers were kept in good humor, but there were still too many claims

The causes that gave rise to claims were so numerous and so widely distributed that if there was ever to be any further reduction in the tremendous sum still paid out for lost or damaged freight, every blessed man on the road would have to take a hand in the game. The things that led to freight-claims were not done from innate depravity, but from ignorance; and the remedy for ignorance is education. Whitelam proposed to educate the whole Frisco force, first to a due appreciation of the enormity of causing a freight-claim, and second in the way to prevent claims.

A correspondence-school education is all well enough for those who want it bad enough to ask for and pay for it; but when education by correspondence is volunteered by your boss it doesn't go any farther than is absolutely essential to the holding of a job, so Whitelam argued.

Personal calls on the whole force of station, train, and engine men were out of the question. Besides, a man is likely to resent the implication that he knows so little about his own business that he has to be taken aside and talked to about it. How, then, was the Frisco to be educated?

Killed Two Birds With One Stone.

Simplest thing in the world. Begin with a meeting, and then hold some more meetings. Railroad men spend the greater part of their lives attending meetings; hence they would not be likely to shy if yet another meeting, or series of meetings, was proposed.

Whitelam proceeded to organize the Frisco Freight-Claim Department Efficiency Association with the executive officers parceled out on a formidable list of committees. Then he went to Fort Smith, where he organized the Fort Smith Station Efficiency Association, with committee on tools and appliances, weighing and inspection committee, executive committee, safety committee, and enough other committees to include everybody about the place

Patrons of the road were invited to come in and see the Efficiency Association in action. Being thus provided with an audience, the Efficiency Association got right down to business. And the patrons could not help learning that their own ignorance, incompetence or indifference was responsible for many of the troubles that ended in a freight-claim, and so they went home and mended their ways. The shrewd Whitelam was killing two birds with one stone

Every shipping-point of any impor-

tance was organized in the same way. In due time Okmulgee reported that in a period of two months after the second meeting of its Efficiency Association not a single error in loading or handling freight had been made

Hugo proudly boasted that it had made 8,074 shipments in one month after organizing an efficiency association without making a single error, the first time in all the history of the railroad that a station had made so many shipments without a mistake.

After making such a fine start, instead of taking it easy, Whitelam redoubled his exertions. He practically lived on the road, going from point to point talking Save a Freight-Claim to enginemen, trainmen, and stationmen.

He installed an industrious editor in his office who sent out a constant flood of circulars, bulletins, diagrams, and other literature to everybody in any way implicated in the handling of freight, telling how this station or that individual was doing fine work and saving money for the company. An inspector was assigned to each division, which he traveled constantly, looking up missing freight and keeping an eye on everything going on in the freight-handling line, making suggestions and talking about the enormity of paying claims.

Whole System Went Dotty.

It wasn't long before the whole system had gone dotty about freight-claims. Why, those Frisco fellows would rather prevent a freight-claim than eat! And they prevented them right and left.

For instance, a conductor was ordered to pick up a car of race-horses for a short haul. After the car was switched into the train he found the car was off center and unsafe to move.

The shipper objected to any delay, saying the horses were scheduled for a certain race meeting. He also objected to putting his horses in the only other car available, which was an ordinary stock-car, lest they might catch cold.

The conductor suggested blankets. Good idea! The car was lined with blankets, the horses were loaded, the shipper was satisfied, and the train was delayed only an hour.

An employee at a small station noticed wheat leaking from a car in a passing train. He flagged the train; the car was set out and repaired, thus avoiding further loss.

A receiving-clerk noticed that a case of coats appeared to have been opened. He refused to receive it until it had been opened and invoiced. Thus he got an actual check of the contents and put the company in a position to decline a claim when presented.

Suggestions by Postal Card.

Employees are furnished with postal cards and urged to use them in reporting anything that might prevent loss or damage to freight. The company has agreed not to use any information thus obtained in disciplining anybody, but to employ it for educational purposes only.

With this understanding every one felt free to point out any fault he saw. In four months nearly four thousand of these cards had been received by the various division superintendents, investigated, and discussed at meetings, while the defects in equipment or facilities or faults in system were mended.

Agent McCain, for example, reported that a sack of coffee for Lebanon, Missouri, had been loaded at St. Louis under freight for stations beyond Lebanon, making it necessary to move all the freight in the car to get at it. Of course the whole road heard of the affair in a bulletin, and it made everybody careful in loading.

Brakeman Skinner reported that certain firms were shipping stationery in cases weighing over two hundred pounds, and that such cases needed metal strips. The matter was referred to the shippers, and they packed their goods properly thereafter.

An engineer was reported who used only his driver-brakes in stopping for a

railroad crossing, thereby shaking up his train. Being bulletined, this led to more care in stopping trains, with a consequent decrease in damage claims arising from rough handling.

Another Frisco man saw some merchandise car-doors left open at noon with no one in charge. That was an invitation to thieves which was not repeated after the whole system had read about it in a bulletin

Another circular enumerated fifty-seven varieties of ways in which damage to freight might be caused, such as delaying live-stock and fruit trains, failure to reice refrigerator-cars, rough handling, and so on and so on.

Every once in a while the Frisco has a special claim-prevention day, in which all hands make an extra splurge to cut down claims. On these days the station-hands are exhorted to be super-careful; all division superintendents wire all train-crews not to lay the foundations for a freight-claim, and even the shippers are invited to do their share

Whitelam thought when he started out that he would be doing fine if he could cut down the freight-claims $100,000 in a year, or five dollars apiece all around. He made that his war-cry. In less than six months the hundred thousand had been saved, and the bunch was ready to start out to make it two hundred thousand for the year. That was done, too, with a few dollars to spare.

Santa Fe Gets in Line.

Such an achievement could not fail to attract attention. One after another the big roads throughout the country took up the "Save-a-Freight-Claim" movement.

The Santa Fe, which has an important live-stock business, found that it was paying an average of $2.93 in damage claims for every car of stock moved in 1910 Then the Frisco idea was introduced, and by 1914 the average had been cut to $1.25 a car, a reduction of 57 per cent.

The North Western started out to save a few freight-claims on the Frisco system. The result was as gratifying to the management as it was amazing.

In the year ending June 30, 1915, the number of claims presented had been reduced 40,000 as compared with the preceding year, while the amount paid to settle freight-claims was reduced $238,860, or 20 per cent.

The North Western also designates special claim-prevention days. Five inspectors travel the road constantly watching methods of handling shipments in the freight-house and on the road, and giving instructions.

The company has issued a booklet with illustrations and diagrams showing the right and the wrong ways of stowing different kinds of freight. The Santa Fe has issued a similar booklet.

Rock Island Saved $100,000.

The Rock Island saved more than a hundred thousand dollars in one year by adopting the Frisco idea

All sorts of new wrinkles are growing out of the Frisco plan. Thus the new Soo terminal in Chicago was designed by the agent and his staff for safety and certainty in loading freight.

An ingenious system of triple checking, first by the receiving-clerk, then the stower, and lastly the trucker, makes a mistake in routing practically impossible.

The Pennsylvania has installed in its car-record office at Philadelphia an over and short bureau operated with the aid of an ingenious fourfold index that saves an immense lot of time and worry in matching overs with shorts.

For the benefit of the non-railroading reader it may be explained that a "short" is an item of freight on a way-bill that for any reason is not delivered at its destination along with the rest of the shipment. When the missing short turns up at some station where it is not wanted it becomes an "over."

The new Pennsylvania index reduces the process of matching shorts with overs to its simplest terms. The value of such

a device may be appreciated when it is known that the bureau receives an average of 2,500 overs and shorts a day.

Pennsy Keeps 24 Inspectors on the Go.

The Pennsylvania keeps twenty-four inspectors on the road hunting lost freight and making other investigations incident to the treatment of freight-claims. In a sample week these inspectors found fifty lost shipments involving claims totaling $2,056, and 93 other stray shipments for which no claims had yet been filed.

Railroad men are not responsible for all the troubles of the freight-claim department by any means. Often the shippers make mistakes in marking their goods, or they pack them in unsuitable cases.

An essential part of the Frisco idea, or the Save-a-Freight-Claim movement is to induce the shippers to do their part. The individual roads try the arts of persuasion with shippers; the American Railway Association employs sterner methods.

For instance, it is proposed that when fiber-board, which has such a vogue for packing-cases, is not up to the standard of strength and security for the contents, the roads shall add an extra 50 per cent to the freight-rate. It is also proposed to refuse to accept for shipment liquids in glass or earthenware containers of more than one-quart capacity, or hats or clothing in cases that are not strapped with iron.

To sum up in the words of President J. W. Newell, addressing the last annual convention of the Freight-Claim Association, "The whole general scheme of receiving, transporting, and delivering freight must be changed."

THE HUMMING WIRES.

BY OLIN L. LYMAN.

SILENCE reigns on the right-of-way,
And the pall of a cupping sky
Lies thick and black, and the moon is hid,
And the gleams of the pale stars die.

The woods loom dark as a wearied mood,
While the waves of the cloud seas roll,
And a brooding hush attends like breath
That ebbs with a passing soul.

Hark! Now a mystic murmur sounds
In the throbbing wires o'erhead—
A weird, nocturnal muttering—
And the emptiness is fled.

Link of the night and rosy dawn,
Speech of the sun and sod,
Flung like the winds from sea to sea,
The whisperings of God!

Help for Men Who Help Themselves

NUMBER 81.

THE ATMOSPHERIC RAILWAY.

BY FREDERICK L. FARNSWORTH.

EVERYBODY knows that hot air has played a notable part in many a railroad scheme, at home and abroad; but possibly everybody may not know that plain atmospheric air has also figured conspicuously in the history of the railroad. Indeed, one of the strangest of the many weird obsessions that serve as milestones marking the progress of development in transportation was the belief that air was superior to steam as motive-power

Astounding as it may seem now, this obsession persisted for more than half a century. Some of its most enthusiastic devotees were to be found among the leading engineers of England, including Sir William Cubitt, chief engineer of the London and Southeastern Railway, who was knighted for his distinguished achievements in his profession; Vignoles, the originator of the T rail; I. T. Brunel, chief engineer of the Great Western Railway, designer of the famous Great Eastern steamship, and many others. Many a session of the Institution of Civil Engineers, for nearly a century the foremost engineering association of Great Britain, was devoted to perfervid debates on the relative merits of "atmospheric railways."

Had Strong Advocates in England

Robert Stephenson, one of the most aggressively skeptical about the advantages of atmospheric railways, was jumped upon so savagely by his associates in the Institution of Civil Engineers that even he backed water, and once conceded that, under certain circumstances, air might possibly be superior to steam. Robert was the son of George Stephenson, who was first to produce a steam locomotive that would work, and while he was regarded as a very fair engineer in other respects, he was thought to be more or less prejudiced in favor of steam on account of what his father had done. To fight him to a standstill, therefore, was regarded as a great triumph by the progressive faction

The conservative Board of Trade was won over to the atmospheric railway, while Parliament surrendered without a dissenting vote upon hearing an enthusiastic report from its special committee appointed to investigate the new marvel. Hundreds of thousands of pounds were dissipated in air by these atmospheric railways before the fact dawned upon credulous investors that they had been fooled.

Even Paris was bitten by the atmospheric-railway bug. Yes, and New York, too—New York, the metropolis of the western hemisphere, whose inhabitants are supposed to know a thing or two, if not more. As recently as 1870 an atmospheric railway was built beneath the thoroughfare since famous as the "Great White Way," the highway of the sophisticated. The newspapers went into panegyrics on the wondrous new method of transportation, while thousands of curious New Yorkers paid twenty-five cents a head to see the atmospheric railway perform.

Was Product of Many Minds.

Like all other great ideas, the atmospheric railway was the product of the collaboration of many great minds in a slow process of evolution. Denis Papin, the French physicist, who built the first steam-engine with a piston, helped Huygens with his air-pump. This pneumatic experience suggested to Papin the idea of using air for transportation. His views were published in the first decade of the eighteenth century.

George Medhurst, an Englishman, elaborated on the idea in 1810, or about six years after Trevithick produced the first steam locomotive that would run. Medhurst's plan was bifurcated, so to speak. That is to say, he outlined the two different schemes destined to be followed for the next sixty years by disciples of the atmospheric railway.

Medhurst told about a steam-carriage for common roads that he built and tried in April, 1820, developing a speed of seven miles an hour, to prove that he was up in steam engineering and, therefore, could have invented a steam railroad if he had wanted to before proceeding to outline his improved plan of using the air.

Scheme No. 1 was to build a tube big enough for carriages carrying passengers or freight. The passengers were to get in the car, which was then to be inserted in the tube. Then all you had to do was to pump out the air ahead of the car in the tube, let in more air behind it and zip! There you were!

Medhurst Demonstrated—on Paper.

Any one with a fairly vivid imagination, who has seen the cartridges shot out of pneumatic tubes in a store, is at liberty to guess what would have happened to the passengers in Medhurst's car when it landed. However, the foundries of that early day were not able to cast tubes large enough to put this scheme into effect. In further elaborating upon his idea in 1827, Medhurst demonstrated, on paper, that he could transport passengers and cattle at a speed of sixty miles an hour at one-fourth of the cost of hauling upon any other kind of a railroad.

Medhurst's other idea was to utilize an air-current to propel cars outside the tube, which could, therefore, be made very much smaller. This got around the trouble about the foundries. In fact, this alternative plan obviated all the difficulties of construction except a few the inventor overlooked.

First, you built your railroad. Next, you laid a common trough, just like that which pigs are fed from, between the rails. This trough was to be kept filled with water. A tube, some nine inches in diameter, was to be cut open and the edges turned back to form "flanches," which were to be immersed in the water in the trough. Thus the contraption would resemble a modern underground trolley-slot turned bottom upward.

The car was to stand on the rails astride the tube. From the bottom of the car hung a bar, the bottom of which was turned

up like a fish-hook. The hook was to reach up into the tube and to be baited with a piston fitting "loosely" in the tube.

All these preparations being made, you pumped the air out of the tube ahead of the piston and let the air in behind it, and away you went, fifty to sixty miles an hour.

One of the minor objections to this scheme was that the railroad had to be perfectly level. At least, no provision was made for keeping water in the trough on a hillside. Another minor difficulty was that no provision was made for preventing the water in the trough from rising into the vacuum produced by pumping the air out of the tube.

Yet another was that no provision was made for preventing leakage around the loose-fitting piston. Probably this was too insignificant to consider, because with a pressure of seven or eight pounds per square inch, if your air-pump worked well, the piston-packing wasn't really necessary. With these few exceptions the plan was more or less perfect from a mechanical standpoint.

Chapter II of the Medhurst Muddle.

In a later edition of the scheme, Medhurst provided a rectangular tube, thus doing away with the two difficulties about the water. Square tubes being more easily made than round, you could have any size you wanted. A carriage running on sixteen wheels was to traverse this tube with a stem reaching up through a loose flap on top to take hold of the car and push it along.

The carriage in the tube was to have a vane in the middle hung on hinges, and worked by a worm-gear from a handle on the car. By opening and closing this vane, the motorman could start and stop the car. The great difficulty was in maintaining a vacuum in the tube.

John Vallance, an English engineer, came to the rescue in 1824 by patenting a development of Medhurst's idea. Two years later Vallance had an experimental car working on a line a few feet long. Then the two formed a partnership; but what they accomplished thereafter is not recorded.

It remained for Thomas Pinkus to take up the propaganda for the atmospheric railway where Medhurst and Vallance left off, and carry it so near perfection that Clegg and Samuda, the next men in line, could produce a working railway. In 1834 Pinkus obtained permission to use half a mile of the West London Railway's line for experimental purposes.

Pinkus Plans a Piston.

Pinkus laid a tube between the rails. In the top of the tube a slot was cut, which was kept closed by a rope laid on it to serve the purposes of a valve to keep out air when the air-pump was applied to produce a vacuum. A piston carried on a stem reaching from the car down through the slot into the tube carried a plow to lift the rope behind the piston but in front of the stem. Air flowing through this opening got behind the piston and pushed it along, carrying the car with it.

It was impossible to maintain a tight joint with the rope, but still the thing worked well enough to impress "many most distinguished men of science and several eminent engineers," to quote the newspaper phraseology of the time. These great men could see as plain as day that Pinkus was hot on the trail of a great idea. All that was needed was to perfect some minor details, such as that of the slot-closer, and then he would have a scheme that would stagger humanity.

In particular, James Pim, Jr., treasurer of the Dublin and Kingstown Railway, went into raptures over Pinkus's plan. Pim lost no time in pointing out to the Earl of Ripon, then president of the Board of Trade, what a grand thing it would be if the government would put up the money to build an atmospheric railway as a branch of the Dublin and Kingstown. His lordship assented.

Accordingly, the first working commercial atmospheric railway was built on the

Old Sod. It ran from Kingstown to Dalkey, a mile and three-quarters distant, up a grade of forty-four feet to the mile, with some pretty sharp curves. With real money to pay for it, engineering talent can always be had. The Kingstown and Dalkey Railway was able to secure the assistance of J. D. A. Samuda and S. Clegg, who had worked out something better than a rope-valve to close the slot in the vacuum-tube. These two patented their scheme, built the railroad, and thereafter were the foremost advocates of the atmospheric railway.

The Kingstown and Dalkey Pioneered.

The Kingstown and Dalkey line had a tube fifteen inches in diameter made in joints nine feet long, the joints being packed air-tight with wool and tallow. The inside of the tube was made smooth by tallowing it under pressure from a piston, thus making a perfectly smooth surface, which in turn made it possible to pack the car-piston tight. In fact, tallow played the star rôle in the atmospheric railway.

The great feature was the flap for closing the slot. A leather flap was riveted tightly to one side of the slot. On the under side of the leather an iron strap fitting into the slot and, forming a sector of the tube, was riveted.

On the upper side of the leather another iron strap was riveted a little wider than the slot. The whole formed a valve just like the valve in an old wooden pump, except that the railway valve was in lengths of fifteen feet.

To make the joint air-tight the loose edge of the flap flopped down on a little trough at one side of the slot, which was filled with a composition of beeswax and tallow, "well worked by hand." This composition was stiff enough to withstand the heat of summer and soft enough to defy the frosts of winter. Later experience showed that it took seventy-five dollars' worth of beeswax and tallow per mile of line per annum to keep the flap in working order.

From the bottom of the car depended a stem carrying a plow in the tube, the front of which was a piston with leather packing to make a tight fit. Back of the piston was a pair of little wheels to lift the flap out of the way of the stem.

Air flowing through the opening acted on the piston to propel the car. Following this came another wheel to close the flap. Last of the procession was a copper pan over the trough, in which a charcoal fire was kept burning to melt the tallow and beeswax so that it would form a tight joint again.

Valves at either end of the tube kept the ends closed so that air could be pumped out ahead of the car. Power was furnished by a boiler supplying steam at four pounds' pressure to an engine of one hundred horse-power to run the air-pump.

The remarkable thing about the Kingstown and Dalkey Railway was that it actually worked. It was opened to the public in 1843, and was operated for twelve years.

Accounts of results obtained vary so widely that readers of the present generation must conclude that the various engineers who visited the line to make reports wrote, not what they saw, but what they thought the atmospheric railway ought to do. One reporter asserted that a speed of eighty miles an hour had been attained, though it is really doubtful whether the management would have cared to permit more than seventy-nine miles and a half per hour on so short a line, considering that the car had no brakes.

Train Went 1¾ Miles in 3½ Minutes.

One of the more conservative reports was made by John Leonard, C.E., to the management of the Cranford and High Peak Railway, which was desirous of finding something better than steam locomotives to operate its road. Leonard reported that the trains had a gross weight of fifteen to twenty tons; that it required two and a half minutes' work with the air-pump to produce a vacuum of twelve to

sixteen inches of mercury before the train could start. He said the speed was thirty to forty miles an hour about the middle of the run, and that the trip of one and three-quarter miles took three and a half minutes

On the strength of a favorable parliamentary report, and of similar opinions by sundry engineers, two atmospheric railways were bu. in England. The London and Croydon was five miles long, the South Devon about the same length. More certainly would have been built but for adverse reports by some hard-headed engineers. One of these was P. W. Barlow, who made a report to the management of the Tunbridge Wells Railway.

Plant Cost Undervalued.

He pointed out a few of the more obvious objections to the atmospheric method, showing that the advocates of air had omitted to figure in the cost of most of the plant, so that the actual cost was double that of a steam road instead of half the cost; that power was not under control, so that waits of at least six minutes at every stop was necessary; that if trains were worked in opposite directions, waits of twenty minutes to half an hour at meeting-points would be necessary, and more to the same purpose.

Brunel flayed Barlow alive for his report. Brunel was an atmospheric enthusiast and engineer of the London and Croydon atmospheric road. He did not hesitate to put his own money into the road, but he was also honest enough to confess, a few years later, that the atmospheric plan was a failure.

By his advice the company abandoned air as motive-power in 1848, after sinking nearly two million dollars in fruitless experiments. It is recorded that the directors avoided all discussion on this sore point on account of "legal considerations."

The French tried the atmospheric railway before its fallaciousness had been demonstrated in England. A line a mile and a half long was built at St. Germain, a suburb of Paris, in 1847, on a grade of 122 feet to the mile. In the course of the next twelve years this line carried a grand total of 73,241 tons of freight in 1,413 trips. At last it dawned upon the Frenchmen that they could do the work for less than half the cost by using steam, and so they tore up their atmospheric plant. That settled the matter for France.

In England, though, notwithstanding the costly teachings of experience, there were engineers who still clung to the atmospheric fallacy. Sir Charles Fox assured the Institution of Civil Engineers in 1866 that the pneumatic system was best for surmounting the heavy grades in crossing the Alps. George Edwards, W. Pole and other members agreed with him.

Alex Doull wanted to tunnel the steeper grades, and blow trains up by means of a huge fan

William Lake, another English engineer, came to the front with a better scheme in 1865. Recognizing the shortcomings of the vacuum tube, and realizing that compressed air could not be used to push a piston along the tube because that would blow open the valve closing the slot, he proposed to lay a hose between the rails and hang a roller down from the motor-car which was to press down on the hose hard enough to squeeze it together.

Transportation "by Hose."

Then all you had to do was to turn compressed air into the hose, which would press against the roller, and thus push the train along. Lake showed that a hose seven inches in diameter, using air at two hundred and fifty pounds' pressure, would boost a train of fifty tons up a one per cent grade at the rate of thirty miles an hour. For a three and a half per cent grade a hose eleven inches in diameter would be needed to keep up the same speed. In order to maintain a steady pressure, a big air reservoir was to be supplied.

At the Crystal Palace Exhibition in London in 1864, T. W. Rammell, an engineer, built an atmospheric railway that

got back to first principles. It consisted of a brick tunnel a third of a mile long and ten feet in diameter—large enough to admit the largest cars then used on the Great Western Railway. The car for use in this tunnel was given a collar edged with bristles, so as to form a tight fit, like a piston, in the tunnel

A fan twenty-two feet in diameter, such as is used in ventilating mines, was set to work to blow the car through the tunnel, just as a boy blows a pea through a pea shooter. A pressure of only two and a half ounces per square inch was required to blow a car containing thirty passengers through at the rate of twenty-four miles an hour. On the return journey the fan was reversed to suck the car toward it

This thing was such a brilliant success that it was deemed worthy of introduction in America. A. E. Beach accordingly exhibited a similar tube and car at the American Institute Fair in New York in 1867.

In the following year the Beach Pneumatic Transit Company was formed to construct an atmospheric railway from the Battery to Harlem River. The first section of this line, extending from Warren Street under Broadway to Murray Street, a little more than one short block, was opened with an "underground Broadway reception" February 26, 1870

The car, cylindrical in form, seated eighteen passengers, though it was planned to run "luxurious" cars one hundred feet long as soon as the road was completed to the Harlem River. It was "brilliantly illuminated" by a single zircon light. This spacious car was "richly upholstered and as comfortable and cozy as the front basement dining-room of a first-class city residence," we are assured

Following Rammel's plan, a big fan was used to blow the car out and suck it back. A committee of ladies took possession of the atmospheric railway, and collected twenty-five cents a head from the thousands of visitors for the benefit of soldiers' orphans. But public interest soon flagged; the fan ceased to waft the luxurious car to and fro; the construction gang never returned. And that was the last of the atmospheric railway in either hemisphere.

TO MY FIREMAN.

BY CHARLES L. FUNNELL.

TAKE a glance at my fireman yonder and look at a man well made;
He earns twice the money they pay him—it's in learning his earning is paid
Some day in the runs that are coming he'll sit on the right-hand side
And watch for the safety of hundreds who think of a run as a ride.

OFF duty he's studying air-brakes and valve-gear and traction and slip;
He must know the insides of his engine before he can drive his first trip.
On the run he must work like a Titan—he develops his back or it breaks
But his strength must be tempered with thinking where they find no excuse for mistakes.

HE may never learn Latin or ethics, he may fail to hoard money and fame;
But he'll leave on the books of the railroad a clean record next to his name
Just balance him up with your banker or lawyer, and ask yourself why
They've won any more than my fireman of the things you can take when you die.

OLD TIMES IN MORSE SHOPS—II.*

Reminiscences of an Elder Day, When the Three "Overland Routes" Throve and Deming, N. M., Was a Big Wire Point.

"OLD BOGY," THE ORIGINAL BOOMER.

He Got Out a Judgment Against the Western Union and Attached All the Plugs in the Switchboard at Helena, Mont., Tying Up the Office for Hours—Omaha Cops Couldn't Tell Which Crowley Twin Beat Them Up.

BY "J. E. M.,"

Author of "Old Times on El Paso S. W.," "Old Times on the 'G. N.,'" "Old Times on the G., H. and S. A.," "Old Times on the West Shore," "Old Times on the 'Gould Southwestern,'" "Old Times on the Erie," etc.

IN a previous article I have mentioned several important telegraph offices throughout the United States—telegraph offices as they exist to-day—but I have not mentioned some of the telegraph offices as they were twenty-five or thirty years ago.

I wonder how many of the old guard remember Deming, New Mexico, as a telegraph point. How many have a recollection of Ogden, Utah, as a large telegraph office? Are there a large number who can tell of Helena, Montana, when it was regarded as a star point in the telegraph world?

When I sit back here and think of these old telegraphic centers, my heart goes back with my thoughts, and I heave a sigh for those who have gone before—those managers and chief operators who had charge of and managed the brass-pounders on the old "Overland Routes"—the Southern, the Central, and the Northern.

Palmy Days of the "Overland Routes."

In the days of which I speak there were no, or next to no, "repeaters." The repeaters which were in actual and practical operation were the Milliken-Hicks—all of you old-timers remember the double-barreled arrangement, which required six cells of battery for the local, and the same for the "pull back."

Such a thing as a direct wire from New York to San Francisco was a dream—a dream too vague to impress any one outside of a few who were convinced that there was such a possibility, and who persistently labored toward its realization;

*Part I of "Old Times in Morse Shops" appeared in the RAILROAD MAN'S MAGAZINE for February, 1917. "J. E. M." has also written another paper of telegraph recollections, entitled "Old Times with Morse Men," which was published in the June, 1916, issue.—EDITOR.

and in consequence the relay offices from coast to coast were maintained.

The Southern Overland Route had its divisional headquarters at Deming, New Mexico. From twenty-five to forty operators were employed at this point. They were first-class telegraphers—they had to be. None others were required or tolerated

These operators were selected from the ranks of the very best from the Kansas City, Chicago, Omaha, and other offices which produced the cream of the profession. As a rule they came to Deming because they desired to gain a knowledge of the wild and woolly West

They usually obtained it

Besides the telegraphers, there were probably as many Chinese and some railroad men. Deming was not a division point at that time, on the railroads. However, two railroads passed through Deming -the Southern Pacific and the Santa Fe. Each line maintained two operators —one days and one at night each

Frank Sleight, Deming's First Manager.

Mr. Frank Sleight was the first manager of the Southern Overland Route at Deming, assisted by his brother Fred, as day chief operator. At that time the Wheatstone system was in operation between Kansas City and Los Angeles. At times it was operated clear through to San Francisco. Deming was the repeater point.

This Wheatstone repeater department was under the supervision of Mr. R. S. Hatch, who afterward became chief operator of the Western Union office at Los Angeles. Now, I understand, he is connected with the executive department of the American Telegraph and Telephone Company.

Deming, New Mexico, was nothing When I say that, I mean it nothing from nothing leaves nothing, and nothing to carry.

Now, Deming is some city. *Then* it was some "burg." Once a telegrapher landed in Deming, unless he carried money enough to get away with, he was compelled to remain until he either died or was carried thence by his "loved friends," for once there one never accumulated enough wealth to go beyond the territorial line

There were, to my knowledge, ten restaurants, each one of which served drinks and each of which had a gambling auxiliary hall. The telegrapher's credit was practically unlimited in these establishments

There Were Stars in Those Days.

We had "stars" there in those days. "Larry" Pearson was with us; so was John Cregan, later superintendent of the Postal at Los Angeles. When Mr. Cregan died a while ago in Kansas City, he was mourned by a multitude of old-timers

There was Frank Robertson, sometime superintendent of the Santa Fe Pacific at Albuquerque; there was Albert Stephenson, who has distinguished himself as an electrician, and there were Fredrick Kelly and John H. Young, the former an electrical engineer, the latter a prominent newspaper man in the West.

They were all telegraphers of the old school pen operators; the typewriter was not in use then.

It seems strange to-day to say that, even as long ago as twenty-five to thirty years, New York had no direct connection with San Francisco, its sister city on the Pacific coast, for to-day, of course, there are many wires working direct quadruplex and composite, as well as telephone combined with telegraph -working constantly between the two cities

At that time the "Southern Route" between New York and the Pacific coast was as follows·

New York to Chicago; Chicago to Kansas City; Kansas City to Deming, New Mexico; Deming to Los Angeles, and Los Angeles to San Francisco.

The Central Overland Route was from New York to Chicago; Chicago to Denver, Colorado; Denver to Ogden, Utah, and thence to San Francisco.

The Northern Overland was from New York to Chicago; Chicago to St. Paul, Minnesota; St. Paul to Helena, Montana; Helena to either Ogden, Utah, or Portland, Oregon, and thence to San Francisco.

In Deming, when we had nothing else to do—we usually had nothing to do except work—we would adjourn to the restaurant, and—well—we placed our meal tickets on the table, and invariably went broke

I remember that Larry Pearson, after working for fifteen months at one hundred dollars per month, and spending nothing except for the bare necessities of life, went into a certain restaurant one morning, after he had made arrangements to take a vacation, and " dropped " nine hundred dollars inside of three hours. The game was open—no one was barred. Larry went back to work, and stayed with us another month

Operatic Stars in Los Angeles Office.

In Los Angeles Western Union office there were many who have distinguished themselves in various vocations. For instance there was Miss Alice Yaw, a prominent opera singer in her time, who died in Germany while attending a musical college.

Her sister, Miss Ellen Beech Yaw, has also distinguished herself as an operatic star; she still resides in the City of the Angels. Miss Ellen Beech Yaw became famous some fifteen years ago, singing a leading part in an opera with Caruso; but, her voice failing her, as report had it, she retired.

I understand that at every opportunity, Miss Ellen Beech Yaw she used to sine " YB "—calls at the telegraph offices to leave her regards, and sometimes even comes in and shows the old-timers how to make dots and dashes.

There was also Nat Furman, of Los Angeles. He afterward became an electrical engineer for the Southern Pacific. To-day he is one of the prominent men of Los Angeles, and a power in the engineering world. By the way, Mr. Furman is a cousin to the Misses Yaw.

There is, or was, practically no " block," or hangout of unemployed telegraphers, in Los Angeles. In the old days there was no necessity for a block, for the operator who was out of employment in Los Angeles, was one who did not care to work, and would not work if work was handed to him on a silver platter.

Big Call for Oprs in Los Angeles.

Telegraphic talent was in great demand, and there was absolutely no excuse for one to remain idle if he had the ability. In consequence when an indigent member of the profession showed up on the block he was fed and referred either to Mr. Beardsley, the manager, or to Mr. Hatch, the chief operator.

If they could not use the man, he was referred to the chief despatcher of the Southern Pacific, Mr. Geo. Corwin, who, in event he had no vacancy on his division, would pass the applicant along to the next division headquarters, at Tulare, where he would in turn be passed to San Francisco in case his services were not needed on that section of the road.

In my first article on " Old-Times in Morse Shops " I mentioned San Francisco and a few of its old-time telegraphers and managers. I failed, however, to include one who deserves more than a mention.

I Meet an Old Friend.

A few days ago, I was walking down one of the principal streets in New York City, when before me I observed a very broad back -a back that could not be mistaken. The owner of the back had his arms crossed before him, and in the crook of his left arm reposed a cane—one of these canes, you know, like a shepherd's crook.

I looked at the back the second time, then passed the gentleman. I had gone but a foot or two, when the shepherd's crook of the cane hooked itself over my arm, and a voice said:

"Hello, John! Where are you going?"

I came to an abrupt stop.

It was Lewis McKissick, now the first assistant to the president of the Western Union Telegraph Company.

"Why, old scout," said he, "when did you come out of the West?"

And I had to tell him

The Rise of "Lew" McKissick

When "Billy" Martin was the chief operator at San Francisco, "Lew" McKissick was the all night chief operator None of us thought Lew was much more than the average. He was a nice scout, and was liked by everybody used to hobnob with the boys—Harry Graham, Phil Wilhelm, Pony Jones, Dan Leiseight, and the rest—and was a hail fellow well met; but we noticed nothing much extraordinary about him.

However, we did observe that Lew had what we called an electrical "bug." And it was that that pushed him ahead.

From San Francisco Mr. McKissick went to Chicago as assistant superintendent. Thereafter he was successively superintendent, general superintendent, and now, as I have said, he is first assistant to the president of the Western Union Telegraph Company.

"Old Bogy," the Original Boomer.

Helena, Montana, was the relay point for the Northern Overland Route. James McMillan, now general superintendent of the Canadian Pacific Railway Telegraph, with offices at Winnipeg, Manitoba, was the manager, while John Swan—who remembers "JS"?—was the chief operator.

At Helena some forty operators were employed. As in Deming, the number included some stars of the telegraph profession. "Old Bogy" (Bogardus), who was well known as "the original boomer," worked here spasmodically. Upon one occasion he succeeded in tying up the business. This was the way it happened:

Bogy was not feeling well; in fact, he had a seal-brown taste in his mouth. Mr. Swan came across one of Bogy's "copies," concerning which he remarked that it was not up to the usual Bogy standard. Bogy took offense at the insinuation; throwing his pen on the floor, he declared that he would not work for the "Union Western" any longer.

Mr. Swan told him to go to the front office and get his money

Bogy went, but there was not money enough in the front office to pay him off, for be it understood that although Helena was a large telegraph office the local receipts were inadequate to pay the force, so that a draft had to be sent from Chicago to meet the salary list each month Consequently when Bogy called upon the manager, Mr. McMillan, there was no currency on hand with which to take up the voucher

Deputy Attached the Plugs.

Bogardus left the office and consulted a lawyer, who in turn obtained a quick judgment against the telegraph company for the amount due. Then, together with a deputy sheriff, they proceeded to put the judgment into effect. They visited the telegraph office, where they found that, according to the manager, there was still no cash on hand

Bogy then instructed the deputy sheriff to attach every plug in the switchboard, which the faithful officer of the law did at once. By pulling all the plugs from the board, he of course cut off all instruments, thereby immediately ending the power and means of wire communication. Helena was a telegraph city marooned There was not a switchboard plug to be obtained unless they be borrowed from the Northern Pacific telegraph office, a mile away. And that office, it developed in time, had no plugs to spare

After two hours or more of negotiations, while the operators chaffed and the wires remained idle and the chiefs at Frisco and Omaha and St. Paul were wondering what in the world had happened, the local management borrowed

enough of the necessary to pay Bogy what was due him.

Bogy walked out of town.

Ogden, the "Boom" Telegraph City.

Ogden, Utah, was in its prime telegraph time, a "boom" city. About fifty operators were employed there. They relayed to Portland, Oregon, and to San Francisco.

The name of the manager in charge in the early eighties was McNamara. He was succeeded by Mr. Thomas Wingate, later chief operator at Portland, Oregon

Ogden, like Deming, was a telegraph town. Any telegrapher who came to Ogden to work on the Overland wanted for nothing.

I believe that Ogden to-day works some fifteen or twenty men, most of them old-timers who have been there for years. But the old Ogden of relay days is no more.

Occasionally when the new Overland circuits, from New York to the Pacific coast, fail, Ogden is called upon to relay to the coast points.

150 Ops at Omaha.

Omaha, Nebraska, while a large city to-day, does not compare with the telegraph city of twenty-five years ago. At that time there were approximately one hundred and fifty telegraphers employed there

This was the great relay point for the Northern Overland Route. Col. J. J. Dickey, afterward superintendent of telegraph for the Union Pacific Railroad, was the chief operator.

Col. Dickey, after completing his services with the Union Pacific, was superintendent of the Western Union at Omaha. He was succeeded as superintendent of telegraph of the Union Pacific by his former chief clerk, Mr. L. H Korty, who died recently while occupying that office. In turn Mr. Korty was succeeded as chief clerk by Mr. John Sheldon, who passed away several years ago. Mr. Sheldon was well-liked by all the telegraphers on the road, and known throughout the country as a friend of the old-timers. Before becoming chief clerk to Mr. Korty he had been manager of the general office at Omaha.

In Omaha, working for the Western Union, there were, as in other large relay offices, many fine operators. Among them were the Crowley Twins. Now the Crowley Twins are no joke. They were no joke at that time.

Episode of the Crowley Twins.

The Crowley Twins were—well, they were the Crowley Twins, and that's all there is to it, except

They looked as much alike as two peas in a pod

They also dressed alike

If one wore tan shoes the other wore tan shoes If Dan had a white hat, Denny had a white hat, and if Denny wore a white vest, Dan had a white vest at the same time.

No one could tell them apart. I knew them for years, and I could not tell Dan from Denny nor Denny from Dan.

One night Dan, who was supposed to work a night trick from 5.30 to 1 A.M., did not show up

Mr. Korty sent a messenger boy for him

the telephone was not in general use at that time—and Denny, who answered the call, told the boy that he would be at work in a few minutes

Denny, not knowing that Dan was "out in town," went to the office, and reported a half-hour late as Dan. As Dan had not put in an appearance by ten o'clock, when the night chief gave Dennis "lunch relief," Dennis proceeded to look for his twin

Gave the Cop a Bunch of Fives

At the corner of Farnum and a cross street, he encountered a policeman, who grabbed him and said.

"Hello, Crowley! You're under arrest."

"Under arrest! " said Dennis in astonishment. "For what?"

"Beating up two officers of the law,

and raising Ned generally," responded the bluecoat.

Dennis tried to argue the question, but it was useless. Then, resorting to primitive measures, he put the cop out of commission. Later on, however, he was captured as he was about to go to the telegraph office to resume his work.

He was taken to the station house, where—behold! his brother, Dan, reposed on the only bench in the cell.

"Hello, Dan!" said Dennis.

"Hello, Dennis!" grinned Dan. "What are you in here for?"

"Dunno," said Dennis; "only they took me for you."

"And they took me for you," said Dan laconically. "Let's fool 'em."

The next morning the Crowleys were taken out of the lock-up and brought before the city magistrate.

"Dennis Crowley," called the attendant.

Both stepped forward.

There was no difference in their appearance. They were alike as two could be.

"Which one is Dennis Crowley?" asked the justice.

Neither answered.

"Who appears against these men?" asked the judge.

Couldn't Tell T'other from Which.

There were two officers present. They had each a fight the night before, but neither could swear as to which one of the Crowley Twins he had fought with. Dan and Dennis looked on with impassive eyes. To all appearances they were the least of those interested.

"Dennis Crowley, stand forward," commanded the judge.

Both stepped forward.

"Daniel Crowley, step backward," said the puzzled justice.

Both took a step backward.

"Now, officers," said the judge, "do you know which one of these two Dromios is Dan and which is Dennis? Do you know which one gave you that nice black eye, Hogan, or do you, McGlynn, know which of these men chewed your left ear?"

"I do not," replied Officer McGlynn; "but 'twas wan of thim!"

"Now, Hogan," continued the judge, "can you swear that either of them gave you that nice shiner?"

"I think me eyes is goin' bad," replied Hogan. "'Twas one of them, but I don't know which."

"In view of the fact," said the judge, "that the officers cannot identify the persons who fought with them — in other words, cannot tell which of the prisoners gave Hogan a black eye, and which one chewed McGlynn's ear, I discharge the prisoners. Now, you Crowley twins, disappear."

And they disappeared.

Dan is now a prominent broker in a large Ohio town, while Dennis, the last time I heard of him, was an official of the Cuban Government Telegraph Service.

St. Paul a Big Relay Office.

St. Paul, Minnesota, was and, probably will always be, a large relay office. There is no block in St. Paul. It's too cold in the winter time, and the summer season is too well filled up with jobs.

The first chief operator of whom I have any recollection was Mr. Kelly. His health was very poor, so he asked for, and received, a transfer to Deming, New Mexico, where he relieved Mr. Sleight, who in turn relieved him in St. Paul for a short time

Mr. Kelly, however, not liking the Southern "metropolis," returned to St. Paul about the year 1880, relieving Mr. Sleight, who was then assigned to other duties.

Portland, Oregon, was something of a relay point—more so than even to-day - when it used to handle the business from Ogden and Helena and transmit it to San Francisco and Los Angeles. There was an old-time chief operator there, whom I don't believe any old-timer will ever forget. His name—well, I'll say "Mac";

you know the rest. Wasn't he a great old scout?

Mac was a Scotchman a canny Scot, if you wish; but his heart was as big as one of his feet, and his feet were of enormous size. Working for him at that time were such old-timers as Sam Kelley, Dan Kelliher, Dan Breen the man who stood on his head to write—and Oliver Humstone.

Stood on His Head to Write

Mr. Breen is now a successful business man in San Antonio, Texas. He is left-handed, and, I believe, makes one of the most beautiful copies of any telegrapher I know of.

But his peculiarity is that he turns his blanks directly upside down, writing with his left hand.

The first time Mac placed him on a wire Breen turned his blanks away from him and told the man at the other end of the wire to "GA." The man went ahead with a vengeance. Dan dipped his pen in the ink, and proceeded leisurely, as it seemed, to copy the message, with the blank turned away from him.

Mac watched him for a few moments, then after Dan had received two or three messages in the well-known copper-plate chirography, tapped him on the shoulder, and said.

"Great Scott, mon! Do ye always stand on yer head to write."

Dan writes, but it is not on his head.

Old Mac, the chief operator, was a peculiar man. Once he placed a man, he would let him alone. He had a habit of going to sleep after dinner, or lunch. Sitting at his desk, which was located in the middle of the floor, he would doze away for an hour or two.

Mac attended church regularly on Sunday mornings with his wife. Mac, however, would doze away after the regular routine, and by the time the preacher gave out the text was invariably in the hands of Morpheus.

One Sunday his preacher noticed him particularly sound asleep in his seat. So, after the regular service, he called Mac to task for it.

"Mr. Mac," said the preacher, "I notice that whenever I start to preach a sermon you go to sleep. Why is it?"

"Well, pastor," said Mac, scratching his great thatch of red hair, "it's this-away: When I hire an operator in my office, I watch him for five minutes to see if he can do the work. Then if he is doing the work I let him alone, because I know that he knows his business.

"Now it's the same way with you. When you start on a sermon I listen to you till I know that you know what you are talking about; then I know that the business is in safe hands, and I go to sleep. Isn't that right, parson?"

And Mac's eyes twinkled as the preacher laughed

"Joe" and "George" of Indianapolis.

Indianapolis, Indiana, has been under the chief operatorship of Mr. Joseph Taylor for many years, and indeed still is, unless he has been succeeded within the last few months - and I do not believe he has been. Joe came to Indianapolis in 188; from New Albany, Indiana, where he learned the business, and has been in Indianapolis ever since.

At one time some years ago he was offered and declined the position of chief operator of the New York City office. Joe was content to remain in Indianapolis, where he has been very popular.

The Indianapolis block is peculiar It is located around the "monument," where at almost any time may be found the festive "blockite."

From the seats on the south side, facing Meridian Street, said blockite can command a view of both the Postal and Western Union offices, and wo to him who comes forth from these offices with money It's "stand and deliver," and they all "deliver" to the best of their several ability

Besides Mr. Taylor, there is another old-timer in Indianapolis, Mr. George Wheatley (he sines "V"). He is the

night chief, and, if I am correct, has been there longer even than Joe.

I do not know of a more popular official than "George." Every one likes him.

When the Bucket-Shops Throve.

Cincinnati, Ohio, was never much of a "boomer" telegraph town. It always has been more of a local office, although a large one. During the gala days of the bucket-shops, however, the Cincinnati block produced many stars.

There were two very large concerns doing the bucket-shop act in Cincinnati; namely, the O'Dell Company and the Morehead Company. Both of these concerns had several millions of dollars back of them and did an enormous business throughout the South and Southwest.

In their main offices in Cincinnati, they employed something like like thirty operators to handle their leased wires, sending out quotations on stocks, grain and cotton. This class of talent demanded and received the very highest of salaries.

Thirty-five to fifty dollars per week was paid in the main office, while in the hundreds of branch offices or agencies throughout the country the telegrapher received not less than twenty-five dollars per week, for seven hours' work, with a half-holiday on Saturday, no holiday work, and no Sunday work.

It was a sad blow to the telegraphers when the small brokers, or "bucket-shops," were put out of business.

In the State of Texas alone, where much cotton is grown, there were to my certain knowledge, seven hundred telegraphers thrown out of employment. In Georgia, Alabama, Kentucky, and other States the small brokers were compelled to close up, and many more hundreds of telegraphers had to look for other employment.

YOU WITH THER GLOOMY FACE.

BY JACK HYATT, JR.

YOU with ther Gloomy Face,
Can it!
Jes' 'cause yer got ther pip,
'R leaky nose,
Er a sore lip,
Don't go down-hill
Thinkin' ye're dyin':
Look an' see
That news kid—
One leg, 'r broken crutch—
Pleasure in life for *him?*
Not much!
Yet—
He's whistlin' an' laughin'
An' gay,
Freezin' an' hungry,
All day!
Ye're kickin',
You with ther Gloomy Face—
Can it!

FINE FEATHERS FOR FOOTMAN.

He's Not a Preparedness Pageant—Only Bank Messenger for the American Express Company's Paris Branch.

WHO comes here?

The gentleman with the military beard, the jaunty cockade the gold laced and bright-buttoned frock coat, and the badge that would stop a joy-rider as far as the eye can reach he is *not* an ambassador plenipotentiary or even the right good captain of a king's navee

This gentleman, all dolled up like a preparedness pageant, is no other than a Paris bank messenger. The corded and tasseled portfolio under his arm contains documents which he is carrying to his boss.

He is a sudden contrast to his messenger-boy colleague of Wall Street, who carries valuable bank papers in a side pocket, in close association with various lengths and colors of twine, bitten apples and other fruits, gumdrops, knives, thumbed volumes detailing recent adventures of the well-known *Carter* family, marbles, the burned remnants of the celebrated "Mecker" brand of cigarettes, as well as in times of stress, a nickel hunk of chewing material named for a weapon much affected in trench warfare

Ah, no! This gay bird of the boulevards honors his position, and would scorn the freckled and toothless kids that hold down the job in America.

The wearer of the glittering uniform here displayed is Albert Clermont, the bank messenger of the American Express Company at Paris; and a very reliable and high-toned carrier he is, too. His picture was recently sent to all of the employees of the express company in this country as an evidence of what a bank messenger may be

IF THIS GENTLEMAN SHOULD EVER THROW UP HIS JOB, HE WOULD DOUBTLESS REFER TO THAT ACT AS "RESIGNING HIS PORTFOLIO"—SEE IT UNDER HIS ARM, THERE, THE SAME AS A CABINET MINISTER? "RESIGNING A PORTFOLIO" IS A PHRASE THAT GOES WELL ALONG WITH COCKADE, MILITARY BEARD, ARM-STRIPES BRASS BUTTONS AND IRIDESCENT SHIELD WHEN ALL IS SAID AND DONE, ALBERT CLERMONT, BANK MESSENGER OF THE AMERICAN EXPRESS COMPANY'S PARIS BRANCH, DOES LOOK GOOD IN HIS BUSINESS SUIT

THE THROTTLE WIDE OPEN.

Huge Earnings of the Carriers Equitably Distributed Among Workers, Investors, and Improvement Projects.

"I want a thousand freight-cars," says the Central of Georgia.

Pennsy is building a new car-repair yard at Greenville, New Jersey.

Illinois Steel is turning out 5,000 tons of 90-pound rails for the Northern Pacific.

Lehigh Valley blew itself to thirty-six Santa Fes and twenty Pacific type locomotives.

Just before the howl went up last February there was a shortage of 109,770 freight-cars.

Never mind the pulmotor; the Pere Marquette has revived its inquiry for one thousand box cars.

Interstate Railroad has placed an order with the Pressed Steel Car Company for five hundred freight-cars.

Illinois Central has ordered twenty Pacific type locomotives, twenty switchers, and thirty-five Mikados.

The railroads sold $288,729,500 of new bonds last year, of which $232,000,000 were to take care of old issues.

United States Steel Corporation earned $333,625,086 last year, or over $130,000,000 more than it did in 1915.

French government is dickering for 150,000 tons of heavy section rails and 20,000 tons of medium section rails.

Five new tracks 4,000 feet long are included in the Great Northern's plans to enlarge its yards at Hillyard, Washington.

Midland and North Western is starting to lay track on its extension from Midland, Texas, to Seminole, about sixty-five miles.

The New York Telephone Company earned 8.37 per cent on its investment in 1916 as compared with 6.70 the previous year.

Ryan Car Company has acquired about fifty acres of land near Chicago, where it will lay out $300,000 to $400,000 on new facilities.

Kentucky South Eastern is planting contracts for a line from Indian Head to the mouth of Bear Creek, about twenty-five miles.

Baltimore's municipal railway on Key Highway is to be extended so as to provide connections with all the steam roads entering the city.

Jacksonville Terminal Company has resigned itself to letting go of $1,000,000 for a new union passenger station at Jacksonville, Florida.

Tampa Southern, recently incorporated, plans to connect Tampa, Florida, with Bradentown and Sarasota, some 57 miles south. Branch lines, too

B. and O. is planning to put $100,000

into a two-mile line from Sago, West Virginia, to a connection with the Coal and Coke Railway at Hampton

It was a chilly day in the "reefer" trade when the Cudahy Refrigerator Line ordered two hundred and fifty center constructions from the American Car and Foundry Company

United States Steel's unfilled orders on January 31 showed a decrease in one month of 73,232 tons, leaving the corporation with 11,474,054 tons of orders to fill

The Lackawanna's gross earnings for last year beat those for 1915 by 15.17 per cent. Its net revenue was $19,639,925 as compared with $17,029,784 the year previous

Rogers, Arkansas, is to be connected with Kingston, forty miles away, and ultimately with Bald Knob, 125 miles, according to the plans of the new Ozark and Arkansas Midland.

Union Pacific will build a passenger station at Grand Island, Nebraska, and the Atlantic Coast Line will cooperate with the Norfolk Southern to do the same for Kinston, North Carolina

New railroad the Port Angeles and Grays Harbor, connecting those two points—is under way in Washington. Length, one hundred and thirty miles; estimated cost, between $4,500,000 and $5,000,000.

Locomotives ordered from January 1 to the middle of last February, according to the *Railway Age Gazette*, totaled 724. This is at the rate of 6,275 for the full year, or about the same rate as the record twelvemonth, 1905.

Pennsylvania Lines are putting up the following mechanical signal plants: 24-lever at West Effingham, Illinois; 48-lever electromechanical near East St. Louis, Illinois; 32-lever at Smithboro, Illinois, 12-lever at Gibson, Indiana; 8-lever at Reelsville, Indiana.

Burlington, South Chicago Terminal Railroad—capital $1,500,000—is organized to build from One Hundredth Street, Chicago, southwesterly 10 miles to city limits. 'S a chip off the Chicago, Burlington and Quincy block.

What's all this talk about a subway rush in New York? Why, the Interborough Rapid Transit, which operates the tubes in the big burg, has just been and gone and placed inquiries for 217 motor and 93 trailer cars, and asks an option on an additional 120 motor and 47 trailer cars. Do you get those little words "inquiries" and "option"?

After ladling out orders to its own Sacramento shops for 2,950 cars, the Southern Pacific comes back at itself strong like an army with these orders for its Houston shops: 1,000 40-ton box cars, 250 stock-cars; 100 flats; 15 cabooses, also 200 12,500-gallon capacity tankers and 126 50-ton drop-bottom gondolas from the Ralston Steel Car Company.

A partial list of railroad and telegraph concerns which have granted bonuses is: Western Union Telegraph Company, bonus; Postal Telegraph-Cable Company, wage increase; American Express Company, bonus; Wells, Fargo & Co., bonus. Western Express Company, bonus; Western Electric Company, bonus; Lackawanna Railway Company, pension increase; Westinghouse Lamp Company, wage increase; Southern Pacific Railway Company, bonus; Union Pacific Railway Company, bonus and insurance plan. Northern Pacific Railway Company, salary increase; Atchison, Topeka and Santa Fe Railway Company, bonus. Bangor and Aroostook Railroad, bonus. American Telephone and Telegraph Company and subsidiaries, bonus

THE CLUES AT THE CROSSOVER.

BY ARMITAGE HARCOURT.

A DETECTIVE NOVELETTE COMPLETE.

CHAPTER I.

A SHOT IN THE CULVERT.

JOHN GAYLORD, chief of detectives, and by virtue of that office also one of the three inspectors of police of Lake City, leaned back in his armchair and quizzically surveyed his two subordinates.

Gray and grizzled by more than twenty years of service in the department, Gaylord, although indurated to a chilled-steel official exterior by experiences during this period, was nevertheless not without his human side.

Just now he was amused.

He had known Detective-Sergeant James McCann for years—ever since, in fact, Gaylord had been a patrolman with a post on the docks fringing the lake-front, and Jimmy a freckled, mischievous imp whose pranks had enlivened the tedium of such few peaceful hours as Gaylord met up with in that locality in the rough old days.

Fred Curtis, the other occupant of the room, was of a totally different type. He was well-educated, even refined, with abundant brown hair, a dark, oval face, dreamy brown eyes, and a nose recalling Napoleon's famous organ.

In temperament and action he was the converse of McCann as strongly as he was in feature; and Jimmy's serio-comic air, his quasi-pugnacious, alert bearing, no less than his bright blue eyes and sandy hair, completed the contrast.

It was Sunday night. Despite the three hundred-odd thousand human beings clustered in the metropolis over which Gaylord presided as solver-in-chief of knotty criminal problems, there was such an unwonted dearth of criminal activities that the rest of the staff had taken the night off, leaving only McCann and Curtis to "stick out the dog-watch" with their superior.

"Do you mind the day that I stuck the grasshopper in the ear of the drayman's horse, up by the Clinton Street culvert under the tracks, and sent the old skate a galloping down over the jack-knife bridge just as it was raising?" inquired McCann.

"It was for stopping him on the peak of the north span that they made me a sergeant," replied Gaylord with a grave smile, "because if the beast had ever fallen over it he'd have landed in the middle of the infant class of the Sunday-school picnic that was on the boat passing into the lake from the river. You were a wild lad then, Jimmy. Little did I ever think to see you in this department."

"I guess you had my number picked out down in the pen that afternoon," said Jimmy with a wry smile. "Well, chief, it was just a case of too much energy. I could learn my lessons and then, when school was out, what was I to do?

"Same way when I became a probationer in the department. If it hadn't been for Fred, here, I'd never have made a promotion.

"Why, what was there to do out in the Ninth precinct? Aside from a fire or two, the only violation of the statutes is when a cow chews her cud wrong-end

foremost. Since they put donkey engines down on the docks all the trouble has moved over into the Polish precinct.

"It was Fred that started me to studying mugs in headquarters, and after we started building up a private rogues' gallery of our own, we began to pal up and down Main Street on our time off. That's how we got Lonny Blackwell, on a pick-up, over in the Navajo Hotel. And, after Lonny, we got enough more by the same system, when we were supposed to be off duty, to get a step-up under you.

"Now, we've been in here a month, and we haven't made a blue mark on your sheet, except spiking those silk thieves down in the Penn Yan yards, and a petty-larceny stiff that rung in a couple of bolognas in the way of fake suit-case checks at the parcel stand. I'm getting rusty."

Gaylord's derisive smile matched the indulgent one that Curtis exhibited.

"You make me think of a pet fox-terrier I had once when you look like that," said the inspector. "Well, Jimmy, when you've been on the job long enough to retire on a pension before they superannuate you, you'll know a policeman's job is like that of a woman running a boarding-house."

"I don't get you, chief," replied the young Irishman.

"Why, it's this way: There's always just so many dishes to wash, and the number of them depends on just how many boarders is eating and how well she feeds the guests. In this city, and in every other, I guess, on the average there's just so much police business; depending, of course, on how many people there are in town and how busy they are.

"One reason the percentage is so low now is that times are so good that every man that wants to work, almost, can get it, at something. If they're working, they ain't stealing or drinking so much. That cuts down the percentage to the crooks with the brains—the fellows who play for the big stakes." And here the mentor paused solemnly to rap his knuckles thrice on the edge of the desk.

"I never knew a dull spell in this department but what it was followed by a crime-wave—either several cases in a row that taxed all the ability and ingenuity we had to solve them, or one case that made us all spin like tops," he concluded.

"It's the law of averages," interpolated Curtis, in his quiet, well-bred tones, "just the same average that makes so many people die out of a thousand—"

The sharp, insistent ring of the telephone decapitated the rest of the other young detective's first remark.

The effect upon the two young detectives was in curious consonance with their habits of mind and thought, as the inspector swerved in his swivel chair and detached the receiver.

Both knew the chances were very much against the call being of a routine character at that late hour, for the bureau closed at twelve for the night, and it was already eleven twenty-five.

There was a flash from the smoldering eyes of Curtis. McCann sat more erect in his chair, his expectant manner so tense and receptive that the resemblance to Gaylord's pet fox-terrier scenting trouble was extraordinary.

"I'll handle it from here," were the listener's only words.

Inspector Gaylord replaced the receiver phlegmatically. Likewise his manner was crisp and official, as he turned to the two younger men, after making a brief memorandum on the official report sheet lying on his desk.

"The watchman of the Penn Yan system at Clinton Avenue station has just reported that he found a dead man, shot through the head from behind, at the west end of the culvert under the tracks some ten minutes ago. The body was still warm. He notified the coroner as well as the desk-sergeant of William Street station, who called me just as soon as the watchman told him. I told them I'd handle the case from here.

"Jimmy, here's your chance to rub all the rust out of your system. That body is mighty near where you stuck the grass-

hopper in the dray-horse's ear, eighteen odd years ago. See what you two boys can show me by eight o'clock to-morrow morning."

The "two boys" went through the door so close together that they almost wedged fast in it. An instant later their footsteps were clattering down the stairs with a reverberation recalling to Gaylord the echo of the horse's hoofs on the planks of the jack-knife bridge the day he had been recommended for promotion to sergeant on account of his clean record, his presence of mind, and his heroism—a promotion directly due to the misplaced energy of Jimmy McCann, eighteen years before.

The coincidence was not only unique, it was even weird, the chief reflected, when, a half-hour or so afterward, he reluctantly pulled down the top of his desk. As he walked homeward it seemed to him that the sultry August night was tempered only by the lake fog drifting in as if to engulf the spirit of the murdered man some five miles away in a winding-sheet as tenuous as the mystical thread of life so viciously sundered.

CHAPTER II.

BEATEN TO IT!

THANKS to the lateness of the hour, and to a smooth macadam boulevard leading to within a hundred yards of the tragedy, the police auto containing Curtis and McCann, and driven by "Clutch" Casey, reached the Penn Yan tracks on Clinton Avenue within exactly eight minutes from the time they left headquarters.

Clinton Avenue ran under the main-line tracks at this point. Just beyond the steel superstructure comprising the crossing the two detectives left the machine and hurried up to the suburban station. Some two hundred yards beyond the station itself, were the four tracks of the railroad, bent abruptly east and west. The west curve, like the east, had numerous crossovers, controlled by a signal tower on the opposite side of the tracks from the station.

The west-bound tracks thus formed a "Y" where they branched off in opposite directions from the main line—the east-bound tracks leading into the Main Street passenger station, in the heart of the city, about five miles beyond; the west-bound continuing on and paralleling the lake-front some hundreds of miles until the road terminated at Chicago.

The historic culvert at which the episode of the "grasshopper" had occurred some eighteen years before, still remained unchanged, for drainage into the river. Across this stream was thrown the jack-knife bridge to which the desultory conversation at headquarters had turned.

Beyond the bridge, and separated from the mainland, lay Frog Island, occupied, in the main, by wharves and grain-elevators, which had replaced the squatter's shanty of nearly two decades previous.

The Penn Yan line, however, had made many improvements since the day the dray-horse had imperiled the lives of the Sunday-school picnic coming down the river. The tracks were now four wide, both east and west. Owing, however, to the narrowness of the tract between the Y and the river, it had not been found feasible for the railroad to send its trains from the Main Street station out on another spur, when these were west-bound.

Hence, the practise was continued of pulling them back the five miles by a shifter engine, out upon the parallel at Clinton Avenue, whence they were picked up by the road-service locomotive and whipped out on the line west-bound after pausing on the Clinton Avenue station block.

This practise worked very well at first; but, as traffic grew and grew, and the number of through passenger-trains increased, it was found expedient to stop one or two of the more important at Clinton Avenue, and not bring them into the Main Street station at all; because to do so, and bring them back again on their

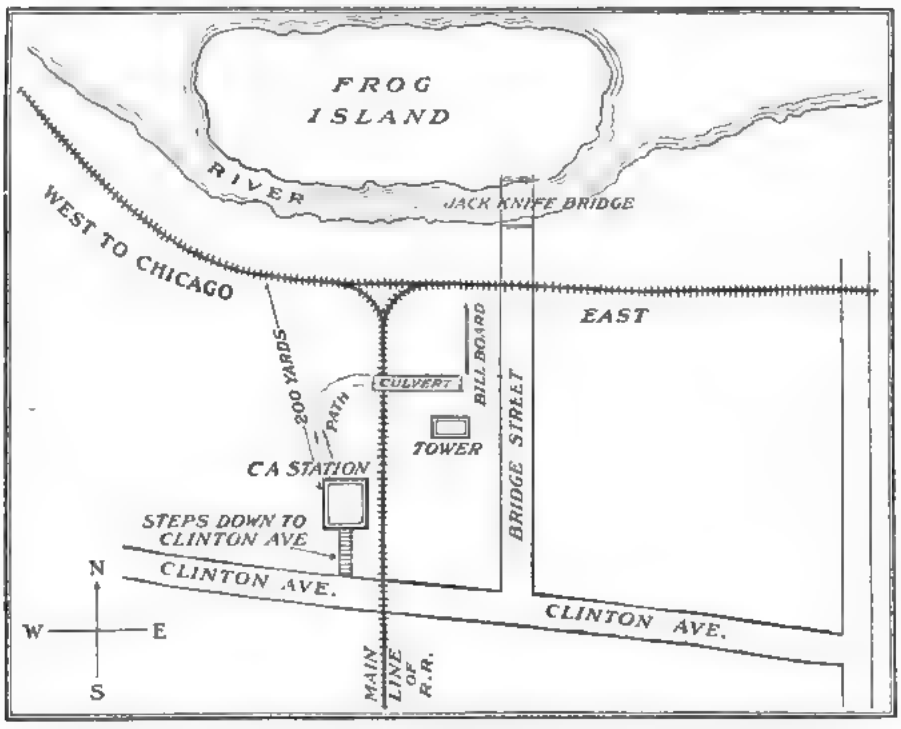


DIAGRAM SHOWING SURROUNDINGS OF CULVERT IN WHICH THE MURDER OCCURRED.

west-bound course, tied up the whole four tracks, east and west, at the Clinton Avenue Y.

And, out of this determination, grew another restriction.

Through passengers between New York and Chicago were not delayed by passengers for the intermediate point at all.

Three crack trains, therefore, made the city of no more importance than a flag-station, despite its three hundred odd thousand residents.

All of this was flitting through the brain of Detective Curtis as he sat apathetic and silent in the speeding automobile, while McCann quivered like the safety valve of a boiler near the danger-pressure line.

The train of thought in Curtis's mind had been started by the inspector's use of the word " shot "

A shot makes a sound.

What, therefore, could be more important, assuming the crime to have been deliberately premeditated, than that the individual who fired the shot should have taken the precaution to time the murder while a train was going either one way or another, into Main Street or out of it, or east or west over the main line, without being diverted to the east-bound Y at all?

While they hurried into the station to find the watchman, McCann gave vent to an expletive of disgust. Another automobile was parked a little farther on from their own. To Jimmy's partial exoneration be it said that this was the machine which had brought Coroner Long to the scene of the tragedy.

Long was a diminutive but no less self-important physician who had a habit of " messing things up " in his endeavors to " hog the limelight " in cases of this sort. That, of itself, was not so bad, as his functions were limited by law to a certain routine.

Long's arrival ahead of them, however, spelled more than a possible division of publicity sure to follow the crime it meant that he would not wait for the po-

lice department to study the scene of the tragedy, but, taking advantage of the archaic character of his office, would assert his official prerogatives through any and all action which seemed best to him, even to removing the corpse, thereby limiting the already slender chances of some substantial clue being discovered.

This, then, became the main motif of McCann's fiery, ebullient thought-process, as he and Curtis arrived at the station.

His worst fears were realized

Just outside the door, on a stretcher improvised from a baggage-truck, lay the sheeted victim.

And, in Coroner Long's pudgy, important palm, lay a .38-caliber pistol with which the crime had been committed. Two of its chambers had been discharged, although only one of the bullets had lodged in the body, and that one from behind, a little above the base of the brain.

McCann tried to steady his voice to a normal tone as he made some perfunctory inquiries regarding the body's position under the culvert; while Curtis, listening eagerly, surreptitiously stepped aside and pocketed a time-table from the rack.

Five minutes later, in company with the watchman who had discovered the body, they were flashing their pocket search-lamps against the top, sides, and flooring of the culvert, while the watchman localized the position of the body for them by a pool of clotted blood, and tried to objectify the scene as it had been when he came upon it.

On the whole it was not a promising beginning for their joint endeavors to comply with Inspector Gaylord's half-whimsical demand to "see what you two boys can show me by eight o'clock tomorrow morning."

CHAPTER III.

JIMMY TALKS AND "PLUGS ALONG."

"JIMMY McCANN took the initiative 'Which way was he lying?" he asked the watchman bruskly.

"His head was pointing down toward the river."

McCann nodded.

He had already guessed as much

The shock of a fatal wound, from behind, especially when added to the impact of a relatively heavy bullet entering the brain, coming in all probability from short range, would very likely have impelled a man to pitch forward, especially as the bed of the culvert, composed of partially eroding limestone, had a decided downward trend toward the river beyond.

"He was layin' half sidewise," supplemented the other. "A young feller; didn't look to be more than twenty three or twenty-four. No beard, yeller hair, light-gray clothes."

"What time was this?" asked McCann

"I mind I looked at the clock when I run up into the station. I was too excited to look at me watch. The clock said eleven ten. I was comin' from my breakfast at me home on Frog Island and took the short cut through this here culvert, like I always do."

"Your breakfast?" repeated McCann.

"Twelve-hour trick, midnight to noon, this week. I wanted to go over to a little shop on Clinton Avenue and git a bag of tobacco. He shuts up about eleven thirty. It's lonesome, nights, around here without a pull of the old pipe.

"That's why I come over so early. I missed the tobacco," he added.

McCann tendered a cigar.

"What did you do first?"

"Well, I dunno, exactly. I remember feeling of his heart. It was stopped. The blood looked fresh, too. And I do know the body was so warrum he couldn't have been dead long."

"Hear anything coming over from the island anything like a shot?"

"Nothing like a shot. It must have been fired before I left the house. It's a good quarter of a mile beyond them elevators you can see over there."

"All right," said McCann. "I may want to talk with you later on."

"I'll be on duty all night, sir, just like I been for the past ten year." When he was gone, McCann turned to Curtis bitterly.

"Isn't that the devil's own luck—Long coming out here ahead of us? He even grabbed the gun and fumbled it all over.

"It's a muggy night, Fred. Whoever had that gun and fired it, not once, but twice, must have left a print on it somewhere, unless he wore gloves. And I don't believe he wore gloves."

"Why not?" asked Curtis.

"Well, Fred, this gun is a thirty-eight, with a short barrel. Put on a glove and try to handle it, quick like, in a hole like this and you'll get me. Too clumsy; see? He had to fire while the dead man was in here—at least he did, didn't he?"

"It would surely seem so."

"It *was* so, for he pulled twice and only hit him once—and from behind, at that. Doesn't that show he was nervous?"

"It surely does, if he fired both shots in here."

"Well, I figure it this way," went on McCann. "The lad that's dead— By the way, did you ever see him before?"

"I don't know him from Adam's off ox, Jimmy."

"Nor I, which makes it the more in*tric*-ate, as the inspector would say. Well, I figure that the fellow that's dead was walking ahead—of course, he must have been, because the other guy got him from behind. There must have been another guy, because nobody but a contortionist could have shot himself in the back of the head.

"Now, if he fired twice, he missed the first shot, because, after the second shot the fellow went down. Hence I figure it must have been the second shot that hit him, because the first shot went wild, and there wasn't any reason to shoot the second time after hitting him the first time.

"And there was every reason not to shoot twice, because that made his chances of being heard twice as bad as if he'd shot only once. Get me?"

"Yes. You're a credit to the profession, Jimmy."

"Don't kid me, Fred."

"I mean it, old pal."

"But that doesn't get us anywhere," protested the other. "Long comes in here and musses us all up. If we had a finger-print or something to go on it would be different. But we haven't—not after all the fumbling he gave that gun. What have we got to go on, Fred?"

Curtis smiled reassuringly.

"We've got our joint and several intelligence," said he. "You know this ground, Jimmy. Keep right on in the way you've started.

"If a scientist can take a thigh-bone of a dinosaur and by his imagination construct a skeleton of that animal, you can take whatever you can dig up around here and build up something that may enable you to get a start after the murderer."

"Now I know you're trying to kid me, Fred. Who's this Dinny Sower?"

Despite the eloquent evidences of a crime Curtis failed to repress a laugh.

"He was a beast a little bigger than your grasshopper—a sort of a cross between a steam-shovel, a freight-locomotive, and a whale. He used to go around this country some hundreds of thousands of years ago, tearing things up by the roots, before you came into it to put the grasshopper in the dray-horse's ear."

"I'd like to put a flea in the ear of the Legislature," grumbled Jimmy, "and have them can all the coroners. They're a vermiform appendix to the police department; at least they give me a bad pain in the neck to-night. But the inspector gave us a clearance out here, and I'm going on.

"Yes, while I might find out where this guy stood that shot, and where that other bullet went to, what chance have I got to mug him and slough him in? Here's a whole townful of people, and how do I know he's one of 'em, or from somewhere else?"

It was a trick of McCann's to go on talking to himself, semiaudibly, while he kept "plugging along," as he expressed it, on some phase of matters that particularly perplexed him.

While he was indulging in his semiaudible monologue, delivering it in a detached fashion from time to time, he was also studying the scene of the crime for some other tangible clue, however slight, which would enable him to continue the man-hunt.

His lamp caught the flash of a small bit of rock overhead vastly whiter than the balance of the culvert's arched covering

Instantly McCann was on the alert.

Spotting with his eye the place where the watchman had discovered the body, Jimmy mentally drew a line from that to the whitish mark on the culvert's roof, where all too evidently a bit of rock had been flecked owing to the swift flight of the first bullet

Mentally again he pictured the figure of the murdered man, not over five feet eight inches high, and pictured his head at the spot in mid air where it would have been when the fatal shot was fired.

With these three points, one in the air and the other two on the ground, Jimmy drew an imaginary line toward the roof from what he judged to be about the place the assassin must have stood, if he stood in the tunnel when the shot was fired

He gave a low whistle of surprise

" Fred, he couldn't have been over five feet eight, himself. How do I know? Easy. Nine out of ten men shoot off a gun while they're squinting over the barrel. Assume this, and when we figure where he hit him — in the back of the head—they *must* have been about the same height."

Having heard no reply, he turned to look at his companion.

Fred Curtis was gone

CHAPTER IV.

SCORE ONE'

ALTHOUGH Irish to the core, Jimmy McCann was an eminently practical sort of person

Superstitious he might be, but afraid of nothing, not even of the traditional midnight return of the murderer to view the scene of the crime.

" If he should come back before Fred does, I'll nail him myself," he chuckled as he thought of this possibility.

Then he became grave

Being eminently practical, Jimmy believed in holding on to anything which he had obtained. Likewise, he had a wholesome respect for Curtis. If Curtis had slipped away for a minute it would be to " cover " something which had suddenly popped into his mind that he might perhaps have overlooked

Meantime Jimmy continued to follow the advice his pal had given.

Having established the theoretical flight of the bullet from the probable place where the murderer had stood, he next walked over to the end of the culvert, near which the bullet had struck.

It was about eight feet from the floor to the roof at this end, and some two feet higher than the end beyond which the Clinton Avenue station stood. A large culvert, but a short way from the tracks, draining directly into the river; but none too large, as Jimmy well remembered from his boyhood days, considering the nature and character of the flood waters that would otherwise be impounded beyond the Penn Yan main line and west-bound tracks, when the snow went off in the spring.

It was more difficult to conjecture at what angle that bullet had flown off the bit of rock from which it had struck, but surprisingly easy when he once projected his head through the mouth of the tunnel.

Easy, because, a little to one side and in the same general direction as the oblique angle from which the bullet must have ricocheted from the roof of tunnel, stood a large bill-board, completely barring the way in that direction.

The bill-board faced the main line of the west-bound tracks in order to arrest the eyes of passengers at this point.

It was flaunting a highly colored lith-

ograph of a certain cigarette, whose merits were supposed to be obvious to the most fleeting glance, because one of that brand was being as obviously enjoyed by a young lady of uncertain nationality, abbreviated costume, but undoubted beauty —when viewed from the tracks beyond.

Jimmy strolled over to the board, flashing his light hither and yon, across the surface of the gaudily colored giantess.

In a moment his short bark of joy further justified the comparison of a fox-terrier applied to him by his chief.

One of the lady's eyes were shot out.

Whereat, still being an eminently practical person, Jimmy grinned briefly; mainly because the height of the lady's eye from the spot where the bullet had glanced off the roof of the culvert enabled him to continue his imaginary line begun in the culvert itself, as he had drawn it in his mind from behind the murdered man's position when fired upon the second time.

Jimmy had gone to high school, albeit a little unwillingly; yet he still retained enough of his plane geometry to know that his first theoretical angle, based on the hypothetical height of the murderer, was right; because although the bullet had been deflected from the horizontal by the curved surface of the culvert roof, causing it to fly off at a slightly oblique angle, it had not been appreciably altered in its original flight with reference to the perpendicular plane.

"It fits," he told himself under his breath as he flashed his lamp across the ground in an endeavor to see what else he could discern

"Now, two men go into that culvert; one stays in. The other comes out. Did he come out *this* way or the other end? Looks like this way.

"Why? Because he *followed* the dead man in. If he followed him to shoot him —and he certainly did shoot him—aren't the chances about two to one he wouldn't come out the way he went in? They're more than that, because on the other side there's the station, and at times a lot of people."

So far McCann's theories seemed to "stand up." He was by no means a "book detective." However, in the absence of any and all clues as to where the murderer had left the scene of the crime, it seemed to him that this conjecture was rather more than justified.

The bill-board occupied the narrow strip of land between the west-bound tracks and the river, beyond which lay Frog Island. Unless the murderer were from Frog Island, he would not have continued on toward that locality, Jimmy reasoned again.

Besides, although the river was comparatively narrow, it was deep and strong, and no man in his senses would have tried to regain the island—assuming that to be his destination—except by using the bridge, the same "jack-knife bridge" which had been there for years.

To gain the bridge, therefore, the assassin must have used Bridge Street, the sole communicating thoroughfare with the island by land. As Bridge Street also led directly into Clinton Avenue, Jimmy decided to make a slight reconnaissance in that direction, and come back to the police automobile by way of Clinton Avenue, to inquire for his partner again.

In the hard-and-fast limitations of his duty he scarcely expected to find any trace of the murderer over on Bridge Street; for, contrary to popular belief, murderers do not, in the majority of cases, obligingly leave indisputable evidences of their presence scattered around the scene of the tragedy, ultimately to lead to their hiding-places.

He turned abruptly to the left to evade the end of the bill-board and crossed the interval to where Bridge Street crossing hung over the east-bound tracks leading to the Main Street passenger station. As he walked, Jimmy cudgeled his brains for the first time as to the probable motive.

"Whoever killed this guy must have known something about this locality," Jimmy finally concluded. "He must have known that on Sunday there's no work, much, on Frog Island; and at this hour

the chances are a thousand to one against his meeting up with any one coming through the culvert.

"And if he knew that much, isn't it likely he knew the fellow that's down at the morgue right now? If he knew both the place and the fellow, he must have known *why* that fellow would be coming through the culvert, just when he did.

"Now, he killed him. People don't kill other people without some reason. The fellow that's killed doesn't belong on Frog Island. His clothes show that. So, he came from somewhere else.

"I don't know if he belonged around here, or if he was a stranger. We may know if he's a town lad by day after to-morrow, because, now that he won't show up at his home, there 'll be an inquiry sent out for him and we'll get it from the 'missing persons' list at headquarters.

"H-m. Too late. The inspector said: 'See what you can show me by eight o'clock to-morrow morning.'"

Jimmy was at the edge of Bridge Street now.

Again he flashed his electric pocket-lamp. Up and down the curb line, across the cobbled pavement for Bridge Street was designed for heavy teaming and trucking its pale yellowish rays glinted.

The indurated surface of the street, however, seemed hopelessly to preclude any trace of a fugitive as adroit and utterly unscrupulous as Jimmy pictured him an individual who would not hesitate at taking human life, provided it was necessary to take it to achieve his own ends.

But, right at his feet, near the edge of the thoroughfare, which sloped down each way from the crown of the highway in the center, was a gutter. And in the gutter was a deposit of sediment, slightly moist, which the last showers had not entirely whirled off.

This Jimmy examined with no small particularity, for it was here if anywhere that he would be likely to come on a footprint—a fresh footprint, possibly—left by the man whom he visualized as fleeing from the culvert in this direction, in that first dash from the dead man's side.

There was no footprint.

But there was something else.

And while the eery wreaths of fog came wisping down and around like sheeted ghosts, to convoy the spirit of the dead man into whatever awaited him, Jimmy McCann's heart gave a thump of exultation.

Next instant he was trotting briskly toward the intersection of Clinton Avenue with Bridge Street, like a fox-terrier who has struck a scent at last

Also he peered up the avenue toward where Fred Curtis and he had left the police auto parked, trusting to "lamp" his pal, for just now Jimmy felt the need of the other's test of what he had so painstakingly learned up to this moment.

In response to his whistle the machine left the curb and rumbled down in his direction.

Clutch Casey was curled up on the front seat.

"Seen Fred?" demanded Jimmy.

"Yep! Took him down to a drug-store about ten minutes ago."

"Is he coming back?"

"Dunno. He told me to come back and wait for you. Said he'd see you later. And you're to keep going until he picks you up or you pick him up, at headquarters later on."

CHAPTER V.

CURTIS STRIKES A TRAIL.

WHEN Fred Curtis abruptly left Jimmy McCann soliloquizing as to certain factors of the crime in the culvert, he felt a sudden qualm of self-distrust.

Being singularly conscientious as well as ambitious, he knew that he had overlooked something which he should have seen to before coming down into the culvert at all.

That something was a more pronounced scrutiny of the clothing of the dead man

than the cursory — almost indifferent — glance he had given it on the baggage truck.

Although he had not intimated anything of the kind, Curtis was fully as much piqued as Jimmy at the ostentatious way in which the coroner had gone about things, prior to the arrival of the men on whom the public relied for the discovery of the murderer. But as it was too late to remonstrate, and wasted words would always mean a loss of time and a proportionate advantage to the fleeing murderer, the young detective wisely held his tongue.

That unexpected interference, however, had disturbed his usual train of thought. To find who murdered a man is not always an easy task; and even once he is found it is far harder to present evidence "beyond a reasonable doubt" that the man so identified and accused is really guilty.

One of the first factors to enable this crime to be traced home—provided that it could be traced at all—was to know who the dead youth was. And it was in this that Curtis felt that he had been remiss, as well as in not taking possession of the revolver

Jimmy McCann had stated the obvious when he said that Coroner Long's fumbling with the weapon militated against finding any trace of the incriminating prints which the weapon might otherwise have revealed. For metal retains finger prints, particularly on such a muggy night as this. While he, no less than his partner, deplored Coroner Long's prior arrival, Curtis had blindly overlooked one possible chance to find a finger-print on the weapon which Coroner Long might not have blotted out or smeared over with one of his own

"One chance," he muttered, "because the murderer shot *twice!*"

In his haste to retrieve what he considered two unpardonable errors, Curtis left Jimmy temporarily to his own devices while he raced out of the end of the culvert on the Clinton Avenue station side and whipped up the railway grade back to the station itself.

He was in the nick of time.

In the midst of a morbid crowd of spectators whom the news had attracted to the scene, Coroner Long was directing his assistant to roll the corpse on the truck to the far end of the station platform, where the sinister wicker basket would shortly convey it to the morgue wagon.

"One moment, doctor," murmured the detective.

Dr. Long turned, then frowned pompously

"Well, what is it?" he inquired rather truculently.

Dissembling his fresh wrath, Curtis turned to the crowd

"Any of you know this man?" he curtly demanded, turning back the sheet to disclose the face.

There was a murmur of dissent.

"Then beat it!" savagely retorted the detective, displaying his shield.

As they withdrew hastily out of earshot, he again turned to the coroner.

"I overlooked asking you, doctor, if there were any papers or valuables on the person of the deceased," said he urbanely.

"Well," snapped that official, "under the law I get possession of the effects, don't I?"

"Until the inquest, certainly. But, doctor, you must remember that while the law will accept the verdict of your jury that this person was murdered 'by some party or parties unknown,' and your duty ends there, mine is only beginning. My superiors have instructed me to find the man who committed it.

"I trust you will understand the difference in our positions and aid me in every way, instead of opposing me. I shall be only too glad to furnish you with any evidence I may be able to procure to bring in another finding, if I am successful."

The cocky little man seemed slightly mollified.

"There wasn't a thing on him except

a hundred dollars in bills and about two and a half in change," he replied.

"Thank you, doctor. Did you observe if there were any marks on his clothing?"

"I saw none."

"I could hardly hope to be more successful, but, if you will permit me—"

Dr. Long hesitated imperceptibly. Then, as the station door opened and three young men emerged who came unhesitatingly over in their direction, he waved his hand airily.

"Go as far as you like, officer," he chirped.

The coroner moved away, intercepting the three new arrivals. They were reporters.

Curtis flashed a contemptuous smile down on the dead man as he whipped off the sheet and searched for some mark on the coat, either on the inside pocket or beneath the lapel, that would ultimately perhaps lead to his identification.

At first he found none.

Then, turning back the skeleton lining of the coat just below the wound at the base of the brain, in the ominous stain he caught a dull glow—a monogram of some letters worked into the fabric with yellow threads.

His ready knife detached it

He replaced the sheet decorously over the body and thrust the bit of lining into his trouser-pocket, unseen by the jabbering group ten feet away.

Presently the coroner returned.

"There's one thing, doctor," said Curtis amiably. "I'd like to take that gun. I'll produce it at the inquest."

The reporter edged nearer.

Had they been alone Curtis well knew that his request would have been as unhesitatingly granted as permission to examine the body again. But Long's pettiness could not endure parting with any evidence of the crime in the presence of the three newspapermen, to whom he had recounted with great gusto the fact of his prior arrival, and much of no consequence which he had "deduced" concerning the crime and its perpetrator.

"What do you want it for?" he demanded. "I can't stay here all night, you know. Both you and your partner looked it over once, didn't you? What good does the gun do you?"

Two of the reporters tittered. The third peered over at Curtis, keenly alive to the fact that something more than merely bickering between the coroner and the police lay behind the request.

This third man was Billy Morse, of the *News;* Morse knew that Curtis was in the detective bureau because he had won his spurs and not through "pull."

Curtis was well acquainted with Morse as well. And in that individual he realized he had an opponent, for Morse would like nothing better than to "put something over on the police" and discover the murderer himself before they succeeded.

Morse, too, had a good detective instinct; indeed, he might even have become an officer, had he not taken to journalism. So Curtis made up his mind that heroic measures must be taken immediately to get that weapon away from the coroner, who otherwise might let the reporter have it.

In Morse's hands all possibility of picking up the hypothetical finger-print would be obliterated utterly; to say nothing of the possibility that Morse, through a dealer, might be able eventually to find out who had purchased it, and thus pick up a trail from a new angle.

Curtis thought quick and hard.

"I don't concede your right to question me," said he somewhat stiffly to Long. "I've already explained what I consider our positions under the law.

"I need that gun to carry out my sworn duty—to find the murderer. How or why is none of your business."

Coroner Long reddened. His self-esteem had been touched on the raw.

"I guess I'll use my own discretion," said he more tartly. "I can give you the weapon, of course. Or I can refuse, can't I?"

"You can."

"And then what?"

"Then," said Curtis without hesitation, "I still have my oath in mind when I say to you that I shall place you under arrest on a nominal charge of obstructing an officer."

"All right -shoot!"

Long danced up and down. This was "good publicity." The two reporters tittered again.

Curtis was seething.

Somewhere, perhaps in the fog-drenched city on whose outskirts he stood, was the man who had fired the fatal shot. His problem was seemingly irresolvable, even without such annoying delays as those which this shallow individual interjected into it.

Resolutely he crushed back his wrath. His smoldering eyes alone betrayed the depth of his feeling as he replied, with assumed jocularity underlaid with pregnant meaning:

"All right, doctor. I'm not out here primarily to pinch you, but to pinch the man that killed some one else. If you insist, why, I'll accommodate you, along with him. But bear this in mind."

He hesitated for the sake of the effect.

"Aw, I'll put up bail as soon as you take me in," the coroner jeered.

"Bear this in mind," repeated Curtis quietly: "That obstructing an officer in pursuit of a murderer makes you an accessory after the fact, and equally guilty with him. No, doctor, I don't think you'll give any bail, because there won't be any to give; and when I frisk you I get the gun anyway."

It was Morse who tittered instead of the other two as Coroner Long shamefacedly surrendered the weapon, which he had wrapped in a pocket-handkerchief.

"Thank you, doctor," said Curtis, as he bolted for the station.

It was Morse who crept around the other side and furtively watched him studying the framed time-table of trains hanging on the wall.

The same astute individual watched Curtis, shortly afterward, write out and file a telegram. Morse also observed the detective enter a phone booth, after carefully scanning something which he concealed in his hand.

Then, with a nonchalant air, Morse reentered the station.

But Curtis was wary. He realized that the booth, while supposed to be sound proof, might be instead a sounding-board.

Promptly he hung up. Leaving the station, he hurried down to where Clutch Casey was curled up somnolently on the driver's seat of the police auto.

An instant later they were dashing down Clinton Avenue.

Morse reached the fog-clouded street in time to see the tail-lamp swallowed up in the mist. By the time he procured a taxi he met Clutch driving back. To the inquiry as to where Curtis had gone, Morse received the reply:

"Down-town."

So down-town the reporter went.

"There's a big hen on, somewhere," he told himself.

As he drove cityward he leaned from the vehicle to scan the pavements of Clinton Avenue. Curtis, emerging from a phone booth in the drug-store, saw him leave the taxi a block below.

Morse knew that in such a short time Curtis could not have gone far in the police auto, just as he knew the Clinton Avenue cars ran only at twenty-minute intervals at that hour.

He did not know, however, that Curtis had sent three phone messages while in the store, nor that he was in the store at all. The third message had been to a near-by garage, and the machine was waiting the detective a block away on a parallel street

Ten minutes later Curtis was at headquarters. The Bertillon bureau was open all night. A brief conference with the photographer, and Curtis produced the weapon with which the murder had been committed

"Listen," said he tersely. "This gun was shot off twice—get me?"

The camera expert nodded.

Curtis leaned lower. His smoldering eyes glowed like a cat's as he pulled the cylinder pin from beneath the barrel, and allowed the cylinder to fall on its end that normally pointed toward the barrel. A sheet of paper had already been placed to receive it.

Again a short, earnest colloquy.

"All right," said the photographer. "It 'll take me a half-hour, all told. Shall I send it out to you?"

"I'll phone you what to do with the print if you get one," said Curtis, vanishing through the door.

"I wish I knew where I could pick up Jimmy," he muttered as he struck out for a Main Street car. "He's the best little boy to put the questions that ever happened. If this fellow holds out on me—well, we'll see."

In ten minutes Curtis left the car and struck down to Park Boulevard a block away. Here he entered the residence district of men of wealth. Secure their frowning mansions loomed in the misty night all but one darkened, as if oblivious to what might be transpiring in the world of the commonplace, from which their affluence set them apart.

All darkened but one only, toward which Fred Curtis lumbered in the mystic blackness. One in which a light on the second floor revealed the presence of some wakeful person.

"I thought so," said the detective grimly as he tiptoed up the steps to the residence of David Marks, banker, and pressed the bell thrice.

Mr. Marks descended the stairs and admitted him.

"You received my phone message?" Curtis asked

"Yes; come up-stairs."

The sleuth followed.

There was both restraint and latent anxiety in the other man's manner, if he read the banker's face aright under the glow of the hooded hall-lamp, he concluded.

At any rate, despite all handicaps, Curtis knew that he was making progress. He followed the other man into a large room, the shelves of which were lined with books.

Mr. Marks waved Curtis to a chair. Marks himself sat down reposefully, though his hands were restless.

"It is unusual for a man in your position to make a call at such an hour," he insinuated.

"Rather," drawled Curtis, removing his hat. "Well, I'll be brief. Why did Henry go to New York, and when? When do you expect him to return—if at all?"

A gray shadow swept the banker's face. If his features had been suddenly plunged into the fog without and impregnated with it, the effect would have been much the same.

They were slightly Oriental in cast, with sparse, gray hair fringing the temples, leaving his head otherwise quite bald. The forehead was wrinkled and there was a deep cleft between the eyes—deepening at the conclusion of the detective's final words.

The eyes, however, were not characteristically Oriental. They had been almost flinty in their expression when Curtis first faced him across the table, as if reflecting their owner's mental resolve to give no information which he could possibly withhold. Then they had seemed like bluish bits of superhardened steel. Now, however, they were melting somewhat.

Curtis had already determined his line of attack. His glance was merely casual as he awaited the delayed reply.

He well knew, however, from the frantic gleam that replaced the former defiance in those eyes, that the inexorable sequence of events which decrees that mercy shall be denied that justice may be vindicated was with him this night.

Despite the thin lips forming a half-bloodless line above the firm chin, the arrest of the man who had murdered another in the culvert beneath the Penn Yan tracks was near.

Curtis felt intuitively that he had hardly more to do than to stretch out his hand

to secure the murderer. He would secure him when he had finished a few questions

The restless hands of the banker clenched tightly.

"Why do you come here at night and ask me such questions in such a tone?" parried David Marks.

"You should know why I ask them of you," pointedly replied the detective, but without umbrage. "Come — I'm waiting!"

CHAPTER VI.

MR. MARKS TALKS.

WITH a shrug, as if to imply that he had nothing to conceal, David Marks reached over the table and picked up a telegram, which he extended to Curtis. It read:

> Will be in Lake City before bank opens Monday Everything O. K H

"H-m. Sent last night from New York. I thought so. When did you get this?"

"About eight o'clock Sunday morning."

"How much money was Henry bringing back with him?"

"Did I say he was bringing any?"

Curtis favored Marks with a cold stare.

"You have said very little. I don't like your attitude, Mr. Marks. I'm here, as you know very well, on police business. Please answer my question."

"What has police business to do with me—or Henry?"

"More than I've spoken of—or will until you tell me how much money Henry is to bring back to Lake City from New York, and why he went to get it.

"You know, and I know, that there's been a crime committed or I wouldn't be here, don't you? Do you propose to aid or obstruct the orderly process of justice?"

"I haven't accused any one of crime, have I?"

"No; nor have I named the man—yet'" significantly returned Curtis. "Neither, Mr. Marks, have I named the crime—yet.

"Let's drop all this sparring and get down to brass tacks. How much was Henry to bring with him, and when did he leave Lake City?"

"I suppose," said the banker more mildly, "that each of us has his own point of view about the banking business and the police business?"

"Well, what of it?"

"As a banker," returned the other, "my first duty is to the depositors and stockholders of—"

"Yes; of the Drovers' National, where Henry is cashier and you are director I get your idea. But you forget that I haven't accused Henry of doing wrong. I'm not after Henry at all"

"And you feel your first duty is toward the public?"

"And to my superiors in the department," crisply supplemented Curtis. "I'm here owing to Inspector Gaylord's orders Continue, please."

"Well, I sent Henry down to get this money and bring it back to New York, after discovering that— that a slight irregularity existed—"

He hesitated. Curtis, who had been merely "finessing"—in police parlance did not correct him by substituting the word "crime." In his preliminary skirmish with Marks, a shrewd, hard-headed banker with a large fortune, Curtis realized that in a way he was at a disadvantage.

In another way he had decidedly the upper hand.

By concealing the fact that Henry was dead, he hoped to elicit other facts that would throw light on the murderer's identity. Now that he had attained his preliminary object, he waited as patiently as he could for the other to go on with his tale in his own way; trusting to grasp the key to the crime by identifying and locating the man who had been involved in the bank's affairs.

"I call it an irregularity," went on Mr. Marks, "because such things, while not usual, are not altogether unknown in banking. They have occurred before and the matter amicably adjusted. So when I called Henry's attention to this loan, and pointed out that it was an unusually large one, I also called for the collateral security and examined it."

"What kind of security did the borrower put up?"

"Warehouse receipts for grain in elevators on Frog Island. One of them was spurious. It was for one hundred thousand bushels of wheat.

"As wheat has been high, the loan of fifty thousand dollars which Henry made on it was not unreasonable; but, as I pointed out to him, he should have noticed the disparity of signatures between this receipt and others on which he had made small loans."

"Quite right," nodded Curtis.

"I made no charge of crime just then," went on the banker, "for two reasons: First, to have had the borrower, a Mr. Schwartz, arrested would not have enabled the bank to regain the money thus fraudulently procured, and the stockholders of the bank might have been losers. Next, it would have been a serious reflection on my son Henry's business acumen, and as his career is just beginning, I wanted to safeguard it in all possible ways. I am sure that he will never make another error—of that kind at least."

"Right again," said Curtis in a husky tone.

The ghastly irony of such a remark, in view of what had happened, hit him hard.

"Then there was also the reputation of the Drovers' National to think of," went on Marks, almost placidly. "A bank makes and holds depositors through its reputation for conservative loans and business prudence. No reputation, no depositors; no depositors, no bank. If this scandal got out and a run started on the bank, without our knowing it, it might have meant ruin to thousands of people on the east side of Lake City. We are a large bank, with a large number of small depositors."

"And so Henry went down to New York with Schwartz to get the money?"

"Day before yesterday. Henry was anxious to redeem his oversight and protect the bank. Also, he determined not to allow Schwartz out of his sight until Schwartz had made restitution, which Schwartz promised, and as he had wealthy relatives in New York—"

"I understand," said Curtis. "Well, I think that will be enough now. Of course you know I'm not after Henry, but I am after Schwartz. I shall not, however, arrest him for this larceny without a further talk with you," he amended, "and I think I can promise that Inspector Gaylord will back me up in that. Meanwhile, as I must hurry back, if you will tell me just where Schwartz is—his first name is—"

"Jacob. But he won't be back until Henry arrives."

"In which case," said Curtis, "I may see all of you—or, I should say, Schwartz—with you."

Mr. Marks's features reflected his perplexity.

"Then your errand here to-night was not primarily with regard to this—this irregularity with our bank?"

"Not primarily," said Curtis. The words cost him a pang as he thought of the still unrevealed tragedy.

"Is Mr. Schwartz in other difficulties?" persisted the banker.

"I cannot definitely say as yet," parried Curtis, rising

"I asked, because I had heard his operations in the commodity market recently had been unfortunate—not to say disastrous," continued the other. "That was another reason for our not notifying the authorities of the fraud and then proceeding to recover with a civil suit in the courts; that and his pathetic pleas that such a course would ruin him."

Curtis left the mansion a victim to mixed emotions.

Schwartz had a motive in killing Henry

Marks; Schwartz undoubtedly knew that the young cashier had the currency to make good on the fraudulent paper; but, while Schwartz could be proven a forger, that proof did not of itself make it conclusive that he was the murderer.

The law, in fact, ever jealous of the lives and liberty of citizens, rules that proof of one crime may not be introduced as proof of another, except in certain instances of which this would certainly not be one

And even with Schwartz a suspect, behind prison bars, the links must still be forged so securely that no "reasonable doubt" could creep in to release him, if he were the murderer.

"If it was Schwartz that killed him," muttered Curtis to himself as he emerged on Park Avenue, "he planned the crime. If he planned the crime didn't he also plan an alibi to hide it, before he committed it? He's a grain speculator shrewd, nimble, and no chicken in worldly experience

"I've got just one move the best of him, and that's this: If they sprang the crooked paper on him without giving him time to figure much ahead, the chances are that he went to New York to get that money without expecting to pull off a murder. Now to pull it off he must have been back here either *with* poor Henry, or *ahead* of him. For the motive of the murder, in any case, was robbery.

"From the way old man Marks talks it's a bet that no one but Henry and himself and Schwartz knew of this 'irregularity,' though how the kid would, or could make a fifty-thousand-dollar loan on his own hook I don't know. Hence, only Schwartz and Henry knew that Henry had the money and would be back in Lake City to-night.

"Even the old man didn't know, apparently — and doesn't know yet that Henry came back on the Queen of the Valley Limited, which is a through train from New York to Chicago; but she doesn't carry passengers for Lake City. I know that or I think I do—because the time of arrival of that one train is the *only* time that could have brought Henry back from New York, *after* sending the telegram to his father that he would be here before the bank opened Monday morning, and *in time* to be shot and discovered by eleven-ten o'clock on Sunday night."

With these two results from his analysis, Curtis felt justified in continuing on, without waiting to go back to the Clinton Avenue station vicinity to rejoin McCann and explain the "lead" which he had stumbled upon.

In fact, to do so was perilous to the course of justice; because if Schwartz were really the murderer, the chances were that he would speedily seek cover elsewhere, if only to build up another possible alibi remote from the scene of the crime and at a considerable distance from Lake City itself, in order to avail himself of his sole chance to confuse a jury as to his whereabouts when the murder was committed

During his meditations Curtis had been walking, slowly but automatically, down Park Avenue

He opened his watch. It was exactly two o'clock

The night was still moonless and the lake fog added to the difficulty of seeing objects at a distance.

There was, therefore, something not wholly explainable, even to himself, in the next discovery that Curtis made.

He was standing near the ornate stone pillar of another pretentious house on the opulent avenue in which the Marks mansion also stood

It was very curious, on the whole as curious as his "hunch" back in the crime-stained culvert to go back and examine the dead man's body again for a clue to his name, or that of the tailor who made the clothing he wore.

The monogram under the skeleton lining had been that of Joseph Levinson, a Lake City exponent of sartorial art. A rather peevish Mr. Levinson around midnight had identified the gray plain

clothes by the full-silk sleeve-lining as that of a garment recently made by him for Henry Marks.

It was by this happy coincidence, and through one of the three phone calls from the Clinton Avenue drug-store whither Curtis had gone to escape the espionage of Morse, the reporter, that the detective had found something tangible upon which to work.

His second phone call had been to the home of David Marks, with its subsequent revelations.

His third had been to the Lake City garage for the taxi which had taken him to police headquarters to test out his other theory of a possible finger-print on the weapon.

All these results, however, had been the direct and proximate result of hard thinking and active following up of such relatively meager information as he had achieved.

Aside from the hunch that he had been neglectful, which had led to his wordless abandonment of Jimmy McCann in the tunnel, they were the mathematical result of a certain effect following a given cause.

The curiosity that now spread over him a half-hypnotic mantle was due to a somewhat similar state of mind as that which had first impelled his steps to where he was now standing.

For, against the ornate post at which he had subconsciously halted after his latest period of self-communion, the word

SCHWARTZ

loomed up almost under his very eyes.

CHAPTER VII.

THE BLOW.

THE possibility that he might be in the immediate vicinity of the murderer himself gave Fred Curtis a new "kick" to continue, without going back to headquarters to ascertain the results of his test of the pistol for finger-prints, to see if he had any reply to the telegram which he had sent while Morse, the reporter, was trying to "out-guess him" in the station at Clinton Avenue.

Both of these details, however, were corroborative; although as well they might prove to be vital links in the chain of evidence, provided Curtis arrested Schwartz and brought him to trial.

There was just one unresolved fragment of doubt in the mind of the now madly thinking sleuth.

He set about resolving it with the same ingenious pertinacity that characterized all his previous efforts thus far, since leaving Jimmy McCann doing his monologue in the culvert where the body had been found.

"Schwartz went to New York with Henry Marks. He went to see relatives, according to David Marks's statement to me, who were wealthy enough to help him out of this irregularity over in the Drovers' National. Of course he made an appeal to these relatives, whoever they were, in person.

"His appeal, along with the presence of Henry Marks, had the expected effect, because Henry wires his father Saturday night from New York, by a night-letter telegram, that he'll be back before the bank opens on Monday morning, and that everything is O. K.

"If Henry took the first train back with the currency, that train was the only one, as I've figured it, that could get him back in Lake City in time to be shot and killed in time to have his body found at eleven ten last night.

"Now, Henry's no fool. He's the son of David Marks, and he's trying to atone for his mistake in loaning fifty thousand dollars on a piece of forged paper. Doesn't it stand to reason that he would be mighty cautious about that fifty thousand if he had it?

"And, if he didn't have it, would Schwartz have murdered him? Henry's too shrewd to stick around a big town like New York with all that money. He's anxious to reassure his father—to prove

to him that his confidence isn't altogether misplaced—else he wouldn't have wired him as he did with the assurance 'Everything O. K.,' and the promise to be back Monday morning before the bank opened.

"There's the rub. Henry was also so anxious to get back that he took the Queen of the Valley and paid a fare from New York to Chicago, and then wasted half of it when he got off at the Clinton Avenue station. That part of it's all right. He wanted to surprise the old man; anyhow, it looks that way.

"But what looks queer to me is this: Why, after all those precautions, and as anxious as he was to get that money back in the Drovers' National—especially after his father and he had agreed to give Schwartz his chance and not ruin him by an immediate exposure—why was it that Henry went down through a culvert, in a roundabout way, in the dark, and let himself be murdered by practically inviting it?"

It was the one weak spot in the heretofore slender but dependable chain of evidence upon which Curtis had thus far been forced to rely. It simply didn't gibe with the known facts — no matter who murdered Henry Marks.

In spite of his relatively brief experience in the detective bureau, Curtis well knew that this very point would be brought out on any trial of Jacob Schwartz, and that upon it hung the net result of all his efforts, thus far, to bring the unknown murderer to justice.

A chain is no stronger than its weakest link, whether it holds huge logs on a bobsled, or holds an accused man in the prisoner's dock of a court of justice.

Despite the fog there was sufficient light from the big arc lamp gently oscillating at the intersection of the two streets to enable Curtis to study the time-table which he had picked up in the Clinton Avenue station almost immediately after arriving at the scene of the crime.

When he had secured that time-table he had intended to use it for a totally different purpose—to see what trains, if any, were in the vicinity of the Y at about the time the shots must have been fired in the culvert.

There was a train which left New York some four hours before the Queen of the Valley. This train, moreover, came directly into the Main Street station at Lake City.

"There's just one chance that Schwartz may have taken that earlier train," mused Curtis. "From the time Henry filed his night-letter telegram to his father, it's a cinch he didn't get that fifty thousand dollars until rather late in the day. He wouldn't lose much time in reassuring his father; and so, as the message was tagged from the railroad station, it shows that Henry came right up there to take his train after he got the money.

"To get back into Lake City ahead of him, Schwartz might have left *after* the promise to repay the money had been ratified, but *before* it was actually paid over. However, that doesn't explain how Henry came to walk like a boob down in that culvert, carrying the money—for he must have carried it unless he sent it on by express.

"Well, we'll see. I can pick up Schwartz on the strength of what I've got, hold him forty-eight hours, and run down the odds and ends while he's safe."

He replaced the time-table and buttoned his coat.

Then resolutely he turned into the still denser darkness of the unlighted, tree-fringed path leading up to the Schwartz home.

There was a chance that Schwartz, assuming he was guilty of the crime, might be at his residence. He was a bachelor, but maintained a home in rather lavish style.

Knowing the murder to be without an actual eye-witness, secure in the fact that it would likely be some hours before the corpse was discovered and identified, the murderer could hardly anticipate a pursuit so soon to the door of his very domicil.

Only this, and nothing more, entered

the mind of Fred Curtis, as he strode confidently toward the house.

Something flashed within his eyes—like the fall of a signal-block in front of an oncoming train—something struck him like the kick of that dinosaur to which he had recommended Jimmy McCann for a theory earlier the same night.

Fred Curtis went down.

For the time being he ceased to speculate, to deduce, to put two and two together.

Out of the denser blackness a fragment of the densest detached itself from the common gloom. The shadow moved down toward the gate as resolutely as Curtis had moved upward from it but far more warily.

At the gate the black blotch paused, depositing a minor blotch behind the same stone pillar against which the stricken detective had leaned

Soundlessly he padded out toward the curb and gazed expectantly up the street. Almost at once there was a diffused glow discernible beyond the abrupt rise of the avenue, some two blocks away.

The added illumination increased in volume.

It topped the summit of the street's grade, diffusing a yellowish band along the street ahead. The headlights of the approaching automobile were powerful. Ordinarily they would have sent their broad beams directly in front of the oncoming car.

"The mist, however, acted like an innumerable series of lenses, so the waiting man by the past marked 'Schwartz' huddled behind it in the semiobscurity of the sinister shadows, until the approaching vehicle came more fully into view almost beneath the overhanging arc lamp at the street's intersection.

The driver was the sole occupant. As the machine drew up at the curb, the lurking shadow detached itself from behind the post, and stepped down to grasp the rear door to the tonneau, while glancing furtively up and down the street.

For some reason he did not immediately enter the vehicle, but prolonged his scrutiny, while the wordless chauffeur remained immobile.

As if satisfied with his inspection of the immediate vicinity, the man who had been evidently waiting for the automobile to arrive started to turn back toward the gate on foot.

Then, out of nowhere, descended a hand which gripped his wrist.

Ere he could divine whence the hand came, that wrist was locked in a circle of steel that bit into his flesh no less brutally than the galling truth bit into his brain that he was a prisoner.

The chauffeur had not moved.

A snarl burst from the captive.

"Who are you? And what is the meaning of this outrage?" he demanded, struggling desperately to prevent the second section of the handcuff from seizing his other wrist.

He struggled in vain

The other remorseless circlet slipped into place with a click ominous to the captive's ears.

"I don't know your name, and I don't know your face," jeered a voice tinged with a slight brogue, "but I'm going to land you, just the same, in a certain ugly place. As for me, call me Dinny Sower'

"Ever hear of Dinny? Well, he's a cross betwixt a young threshing machine, a Ferris wheel, and a horned toad. It was Dinny that rooted up the ground where the culvert is under the Penn Yan tracks, more'n a hundred thousand years ago. If it wasn't for Dinny Sower you wouldn't be facing a charge of homicide right now, would you?"

CHAPTER VIII.

MORSE SLEUTHS, TOO.

BILLY MORSE, of the *News*, was not altogether so chagrined at his "losing" Fred Curtis as he might have been but for two facts. One was, he had immediately recognized the face of the murdered man, when Curtis exposed it on

the occasion of the detective's second search; the other was that the identity of the disputed weapon, which Coroner Long had displayed to the three reporters on the platform of the Clinton Avenue station, before the "argument" as to its possession arose, was equally recognizable to Morse.

Morse, while genuinely shocked at the identity of the murdered man, did not permit his acute sorrow at the untoward event either to loosen his tongue or benumb his faculties.

Had he met Henry Marks on the station alive and well the incident would have occasioned him little or no surprise, for Marks and he belonged to the same college fraternity, and only the middle of the previous week had dined together at the local chapter-house.

After dinner they had also played a game of billiards. During the game Morse caught a gleam from Henry's hip-pocket, and jestingly inquired if his opponent intended to exact summary vengeance if he was defeated.

Henry replied, rather more seriously, Morse thought, than the occasion warranted, that he "was going out of town for a day or two and was taking the gun along for protection."

Thus fortified, Morse, known to his intimates as "Corkscrew" from his ability to worm out police secrets, realized his immense advantage over the detectives of the department in the chase after the murderer. Moreover, as the *News* was an evening paper, he could afford to take his time in developing any clues he might possess.

Coroner Long had told all three reporters frankly that no one had been able thus far to identify the body.

It was no part of Morse's scheme of things to erupt information in front of the other two reporters, as they both worked on newspapers which came out before daybreak. To keep a still tongue in his head, therefore, and permit the *News* to make the "exclusive announcement" as to who had been killed at least until after the first editions—was plainly the part of wisdom for that reason; while it left him unhampered to "do his bit" if possible, in running down the crime.

He had besides a strong personal feeling in the matter of seeing the criminal apprehended. To play an active part in that apprehension became his second objective.

After "losing" Curtis, therefore, and remembering that Curtis and McCann worked together, Morse, shrewdly divining that McCann was probably still in the vicinity of the crime, directed his taxi to go back to the Clinton Avenue station and trail the police car.

He took up his position in time to witness McCann's rather hurried return from down Clinton Avenue, and overhear his inquiry as to the whereabouts of Curtis.

The reply that Clutch Casey made was not clearly audible, but, by the simple expedient of following McCann when Clutch drove the latter back to the Clinton Avenue drug-store to look for Curtis, Morse felt that he would come across the other detective in that way as soon as in any other.

He had a wholesome respect, as stated, for both the young men, because of their talents and hard work. The "pick-up" of Lonny Blackman, notorious head of the Fox-Blackman gang of bank swindlers, had been an achievement of which even a veteran detective might have been proud.

The fact that McCann and Curtis had been sent out on the case by Inspector Gaylord was evidence that the department shared, in part at least, Morse's own private opinion. So, anticipating his early overtaking of Curtis, Morse "tagged" the police auto back to the drug-store, and from a distance watched McCann leave the machine, enter the store, and emerge from it again—minus the other expected detective.

McCann had taken this step, in spite of Clutch Casey's statement, in the hope that Curtis might be still in the drug-store. He was disappointed in not find-

ing him, and, for the first time, a little piqued.

It wasn't like Fred to leave him without a word and then "fade out" again. But McCann's pique was not wholly at this unexplained act of his associate—rather it was due more to the fact that he wanted to convey to Fred, without delay, what he believed was a "direct lead" to the identity of the criminal they were seeking.

Leaving the drug-store, McCann somewhat feverishly directed Clutch Casey to "step on her." Clutch accelerated speed. The result was that the slower taxi in which Morse was riding was distanced by the time Main Street was reached.

Morse proceeded directly to headquarters, on the theory that the police auto had gone there. He saw it where it usually stood, and as Clutch Casey was still humped up on the front seat, Morse remained for another half-hour or so, ensconced in the obscurity of his own vehicle, seeing but unseen.

At the end of that period there was still no sign of either Curtis or McCann. Morse waited for another half-hour, on the theory that one or both of them was still inside the building.

Owing to the machine being out of sight, Morse had no way of knowing that McCann had promptly left it, upon turning into Main Street, and directed Clutch to remain at headquarters until either Jimmy himself returned, or Curtis showed up, as he was expected to, at almost any minute

"In case he does, have him wait for me," was McCann's parting admonition to Clutch Casey, after which Jimmy darted away as if his fox-terrier attributes had expanded to the instincts of a bloodhound

At two o'clock Morse decided that he would "have a look up-stairs." Investigation showed that neither of the detectives he was seeking was in the building; the desk-sergeant didn't know where either of them was. It was then that Morse descended and wakened Clutch Casey, to whom murders were all in the night's work, to reiterate his inquiry as to the whereabouts of the two detectives.

Clutch, likewise, knew nothing of the whereabouts of either.

Morse felt that it was all straight; hence he whispered to himself, "the cops must have some sort of a lead." To remain idle longer was to endanger his own reputation as "Corkscrew"; quite obviously he determined to go out to the Marks mansion, rouse up the old banker, and, as gently as possible, break to him the terrible news that his son was no longer in the land of the living.

Despite police experience, however, this task was one distinctly not to the liking of Billy Morse. Had Henry Marks been a total stranger, it would have been different. In that event he would never have tried to trail either of the detectives, to "get in through the cellar window" on whatever they managed to "dig up."

"It's a fierce thing to have to do in order to get a lead on who killed that boy," he ruminated, as he stood half-irresolutely by the still waiting taxi. "I hate to do it. It's almost as great a crime to wake up that poor old man out of a sound sleep, and poke such a fact at him, as it was to kill Henry.

"Well, I've got to do it—and, anyway, he'll find it out in the morning. I'd like to let him sleep, but by doing that I may be aiding the man who killed him to make a getaway."

Thus steeling his nerves to the obnoxious duty, Morse started to reenter the taxi. There was a moment of delay while his chauffeur cranked the machine—a delay, as it proved, pregnant with a new event, and one which again checked his unpleasant errand for some hours more.

Around the corner swept a high-powered, long, low-bodied touring-car, which, without devious preliminary, pulled in smartly behind the police machine.

Although almost a block away, Morse nevertheless immediately recognized McCann as the latter emerged, urging two captives ahead of him up the steps to the detective bureau. One man—a somewhat

short, thick-set fellow McCann was piloting ahead of him by the arm; the other man he steered at the point of a drawn gun.

"Blow-off, eh!" grunted Morse, now genuinely chagrined. "Well, if they haven't got both of them right, it won't do the boobs on the morning sheets any good anyway. I guess I'll horn in right now, and keep on horning in until the *News*, as usual, has the right dope on all of this ahead of any and all competitors."

As he hot-footed it down to the entrance to headquarters, Morse did not overlook one very essential clue of his own—the number on the license plate of the last-arriving auto. He wrote it into his memorandum book on the fly, then bolted up the stairs, just in time to meet McCann again descending.

When Morse discreetly followed the young detective down again five minutes later, Clutch Casey had already taken the second car into the police garage. From McCann's expression as he reentered the bureau, Morse realized that he still had to "travel some" to unravel the identities of the two prisoners, if the story his paper carried was to be complete in detail, and not a mere rehash of whatever meager crumbs the department might see fit to hand out as the common property of all the afternoon reporters.

Morse lounged nonchalantly back into the reporters' room.

Until the register of auto licenses was open, he could not learn who owned the machine, and hence was blocked from getting a clue to its occupants.

He was again on the point of leaving for the Marks residence when the arrival of Inspector Gaylord gave him fresh pause.

After a bit McCann emerged from the latter's office. Corkscrew Morse deftly interposed himself between the detective and the door.

"Who are your suspects, Jimmy?" he asked.

"They're booked on the special blotter as John Doe and Richard Roe," Jimmy told him with a grin.

"But you know their real names?"

"I only wish I did."

Morse thrilled.

"Well, what are they in for?"

"Murder."

"Of whom?"

"You'll find his body at the morgue. I don't know his name, either."

Morse gave an incredulous whistle, following this by a smile, as he realized the officer was frank with him.

"Well, Jimmy," said he, "it's now a little after four o'clock. Great grief! Where's this night blown away to? I'll match you at six o'clock."

"Match your grandmother!"

"Guess again. You haven't proof that these men are really murderers, have you?"

"I have. One of them killed the young blond boy to-night. I've got him—one of them, that is—dead to rights."

"Good work, Jimmy! Now, I know who the blond boy, as you call him, is!"

"Go on with you!"

"Fact. I'll match you his name against your evidence for the first edition of the *News!* Come on; I dare you!"

Jimmy hesitated.

"I'll have to see the inspector before I give out anything," said he. "And, besides, when Fred comes in he'll have a lot more dope, including what you've got. Later on, maybe."

"Where's Curtis now?"

"I don't know. I'm expecting to see him any minute now. He's to come in here."

Billy Morse, inwardly lamenting that his nickname could not be immediately justified, decided that there was no longer any use in lingering around such an unpromising vicinity, when there was a possibility of action elsewhere.

He promptly cast sentiment to the winds, scurried down the stairs, and stepped briskly for his waiting taxi. Clutch Casey was again somnolent in the police auto as Morse sped away on his

hateful errand to the home of David Marks.

CHAPTER IX

FOG-MIST AND BRAIN-MIST.

THE first pennons of the dawn were fluttering across the eastern sky when Fred Curtis again came dimly back toward the world of things as they are. The mists of the physical fog which also surrounded him were growing thinner with the land breeze beating them back into the lake from which they had emerged, and soon the sunrise would complete their dispersing. But the mists in the detective's brain still persisted.

He was in a *hinterland* of semiconsciousness—just beyond the border line of normal effort, fighting instinctively, with some latent impulse urging him on

He could not rise — he could merely crawl.

From the numbed caverns of his brain there came no coherent thought, merely an agonizing prod that he must keep on and on.

He kept on, sometimes like a worm on his belly, sometimes like a dog on his paws. Gradually as he crawled he could discern the difference between the smooth pavement and the gravel that pressed its flinty points into his hands when he steered obliquely away from it, into the driveway.

It was his first, faint comprehension; and the light of the new day was battling no more valiantly against the fog-enshrouded, crime-drenched shadows of the fatal culvert under the Penn Yan tracks than Curtis's all-dominant, latent will to do was battling with his injured head to reassert its supremacy on the throne of reason.

He clawed half-blindly at some obstruction barring his further pathway. It rose to a prodigious and unscalable height before him. Doggedly he clasped it and tried to pull himself erect. He did not realize that he was combating the same name-post against which he had leaned prior to turning into the evil darkness of the approach to the house of Jacob Schwartz.

His strength was not equal to the effort.

He half slid, half fell into the shrubbery behind the post, and, with the same blind, molelike instinct that impelled him to move, thrust out his hands to break his fall

One wrist plunged through a loop. When he tried to withdraw it again he could not, because he did not yet possess sufficient coordination of his faculties to realize what the thing was or how to extricate the imprisoned wrist.

Presently, however, he forced himself again to attempt the same wormlike method of progress, and, dragging the heavy obstruction to the still imprisoned wrist, he gradually drew out into the center of the avenue.

Speeding over the same rise in the avenue that another machine had mounted a few hours before, came the taxi with Corkscrew Billy Morse on his repugnant errand, to notify a man past life's prime of the untimely death of his only son.

Down through the remnant of the lake-fog the driver plunged until he descried something that looked like a large dog directly in his path. It was too late to swerve—too late to do aught but jam his brakes with all the power of his muscles; and still the momentum of the taxi impelled it to skid against the wabbling something that hesitated to run out of harm's way.

Another moment, and Morse was with the chauffeur in the road, scanning the face of Fred Curtis, to whose left wrist was pendant, when they raised him, an alligator bag bearing the initials "H. M."

Morse whipped out his flask and stuck it to the sleuth's lips.

Curtis drank blindly, choked violently, recovered his breath, and drank again.

"Better?" asked the reporter.

Curtis nodded. Then his eyes unclosed.

"What time is it?" he wheezed. "And

what kind of rum do you call that stuff you gave me?"

"My own decoction — ghigghery-ghee!" laughed Morse. "Say, Fred, where've you been? Jimmy McCann is waiting for you at headquarters, and he says he's got the murderer of that boy out at Clinton Avenue!"

"Something hit me!" replied Curtis as he tried to rise

They aided him into the machine.

"Well, it wasn't our machine," said the driver. "I jammed her so tight I can't hardly take off the emergency. You was wabbling on your hands and knees across the street when I first seen you. It must 'a' been somebody else that hit you."

"Take me to headquarters," muttered Curtis. "What's ghigghery-ghee, anyhow?"

Morse directed the driver to comply with the stricken chap's request.

"I won't tell, because I might incriminate myself," he gibed.

"Do you make it yourself?"

"Discovered!" mocked Morse. "Yes, Fred. I make it out of prune-juice, pure cider, and raw potatoes."

He passed over the flask again.

Curtis waved it aside.

"It's got a kick like the hind hoof of a dinosaur," said he with the wraith of a grin. "Who is this Jimmy's got locked up for the murder?"

"He says he doesn't know him."

"Where did he get him?"

"He won't tell. He says he doesn't even know who the dead lad is. But I know. I tried to match him, but he said to wait until you came in."

"I know who the dead lad is, too."

"Get out!" jeered Morse. "Who told you his name?"

"His father and I had a long talk. But I didn't tell him his boy was dead. If you know who it is, you tell him, will you?"

Morse stared

Then they drew up at headquarters, and he helped Curtis up the stairs.

"Don't forget your baggage," said he, handling him the alligator bag with the initials "H. M."

"What's this?" asked Curtis.

"Don't you know?" retorted Morse. "You had your wrist through the handle when we ran on you."

Curtis gave it a blank glance before reeling into the territory forbidden to the reporter, Inspector's Gaylord's private office. Nevertheless he took it with him

"There's a telegram for you here, and a print from the Bertillon department," said Gaylord, while Jimmy McCann muffled a bark of joy at the sight of his pal.

CHAPTER X.

DICE OF GOD.

JACOB SCHWARTZ gazed defiantly into three pairs of accusing eyes. Inspector Gaylord sat facing him, and flanking their chief were McCann and Curtis. The last named was still pale, and his head was bandaged. Otherwise he had recovered the use of his faculties to a large degree, although he was still somewhat weak after his ordeal.

"Gentlemen," said Schwartz, "I am an intelligent man. As such I refuse to be intimidated. I stand on my constitutional rights to be taken before a magistrate, arraigned, accused of any crime of which I am suspected, and the evidence presented against me."

"You're dead innocent, aren't you?" sneered McCann.

"The law accords me that presumption, even although you believe the contrary, and until I am proven guilty—beyond a reasonable doubt," pointedly returned the prisoner.

"Just as the law requires you to register that big car of yours and get a license before you can drive it—hey?" grinned McCann.

"Exactly," dryly returned Schwartz.

"Then," continued Jimmy, "if you're such a law-abiding gentleman, why don't you come across? Why don't you give

us an explanation as to how your car was standing out on Bridge Street to-night, close up to the curb, when this murder was pulled off?"

"Whose murder?"

"And why," pursued the fox-terrier, now become the bloodhound, "you are foolish enough to have a vacuum-cup tire on the left rear wheel and a cord tire on the right rear wheel? Don't you know tires like that are picked up easy? Yours were, weren't they?"

"My chauffeur attends to buying my tires. Really, gentlemen —"

"And he drives the car, too, doesn't he? Well, he's come clean already. He says he didn't drive the car out there. Who did?

"He swears you phoned him around two o'clock—he can't be sure of the exact time—this morning, to come and get you. Well, he came, didn't he? And I got you, didn't I? Got you on those two tires—both oversize, by the way—after you'd lamped the street, up and down, and were turning back to get the swag you'd taken off the man you killed!"

"I still refuse to do anything except to listen to you. You're an entertaining young man, and I will admit that my arrest was a surprise."

"It ought to be," grinned McCann, "for I spotted that car in the garage where you left it this evening, and tied myself into the tire-rack when your man took it out to get you. They say over at the garage that you brought the car in yourself to-night."

Schwartz's face became livid. He forced himself to remain wordless. There was a period of silence, broken at last by the prisoner:

"I can only reiterate, gentlemen, that I stand upon my constitutional rights. I will explain my car's presence on Bridge Street at the proper time. If you knew my antecedents you wouldn't think of bringing such a charge against me on such flimsy evidence."

"Flimsy?" echoed the inspector with a frown.

"The city directory gives my name and occupation," purred Schwartz, following up his advantage suavely. "Any one who knows me will tell you I visit Frog Island in the course of my business innumerable times, using the jack-knife bridge across the river, which is the only way to get there with a machine."

McCann tipped Curtis a cryptic wink.

"Which one of the elevators was it on Frog Island that you used in the receipt you forged out at the Drovers' National Bank?" queried Curtis deliberately.

"Am I accused of forgery?" asked Schwartz with a sneer. "If so I am ready to face my accusers."

"You won't have the chance," returned Curtis equably. "Just as I won't get my chance to see the law punish you for black-jacking me on your driveway early this morning."

Schwartz glared.

"It isn't necessary to subject you to interrogation," quietly went on the detective.

"Then why do it?" retorted Schwartz.

"Simply my idea to help my partner here, James McCann. You see," went on Curtis half-apologetically, "he admires me a little, because I read a lot. I was telling him the other day of a phrase in one of Emerson's essays: 'The dice of God are always loaded.' Let me show you how Jimmy can learn something—just as he taught me something, to-night."

"I'm not interested."

"Oh, yes, you are — more than any other man in the world. Because in the due course of events the things I'll show you now will be shown to other men, according to law. You can listen then as you can now. You don't need to open your mouth. Just listen, and see why the dice of God are always loaded. If they weren't loaded you wouldn't be here now."

"I'm from Missouri," craftily returned the prisoner. "Show me!"

"You were on train No. 8, leaving a certain railway station in New York at five o'clock Saturday night. It brought

you into Lake City at seven o'clock, Eastern time, next morning

"What you did from then on is immaterial until about nine, when you went to the garage and took out your own machine — an unwise thing, because you never did it before. That's why they remember you so well. What you did then is immaterial until the Queen of the Valley arrived, at 10.45. Henry Marks was on that train with a bag containing the money your brother had collected to take up your forged paper.

"You met Henry. You explained that you would take him home in your machine, that you had already seen his father — which you had not done — and Henry, unthinkingly, let you lead him by the short-cut through the tunnel, to where you explained your machine was parked. He could see the lights of the machine, under the billboard base, through the end of the tunnel, or he wouldn't have gone in ahead of you. You followed.

"You seized on the pistol he had to safeguard the money. You fired twice. Once you missed. The second time the shot killed your victim. You dropped the pistol, because it was dangerous to carry it away.

"Unseen and unheard, because the Queen of the Valley, after changing engines, was running out over the crossovers, you emerged from the other end and entered your machine. You came up to Clinton Avenue, turned in, and came down, as usual.

"With the exception that you first left the bag with the money in the parkway leading to your house, you went straight back to the garage. You might be suspected. The bag would be evidence.

"You were throwing the loaded dice, only you didn't realize which spots were loaded. Hence, you were careful. But not careful enough."

"I like your style of narrative. Why don't you write stories?" jeered Schwartz.

"Facts are more surprising than even a vivid imagination, sometimes. Also more abundant, if we know where to look for them. For instance, if you'll pardon my reference to Emerson, again, he says: 'Commit a crime and the earth is made of glass!' meaning, the crime is transparent and easy to see, if we only know where to look.

"I didn't know where to look," admitted Curtis ingenuously, "until Jimmy here remarked you had shot twice. And he was grumbling about the coroner messing up the gun so your finger-prints wouldn't show.

"I went back and got the gun. I took it to the Bertillon department. As the dice of God are *always* loaded—not *sometimes*—it happens that even a fussy coroner couldn't prevent the dice from falling the way God decreed they should fall." Curtis passed over a sheet of paper

"There's the thumb-print we took of you ten minutes ago. Here's the photograph of the thumb-print that was on the left-hand side of the cylinder when you fired the first shot—and the cylinder rolled up automatically for the second your hand fired.

"It was your hand, because that second shot preserved, unharmed, the imprint under the contour of the barrel—the imprint that shows you the dice were loaded, even when you pulled that trigger. But for Jimmy's remark I wouldn't have thought of that."

"Or, as we might also say, seeing that Fred and I always play both ends against the middle," continued Jimmy McCann, "I wouldn't have showed up to nail you in the getaway in the middle of the night, if it hadn't been for him telling me of this Dinny Sower. I mentioned his name, didn't I, when I grabbed you?"

"All you've got to do is to make good to twelve men," cheerfully commented Schwartz. "In the mean time, gentlemen, I presume there's no objection, now that you're so cock-sure of your case, against my having an attorney? I believe the law is mandatory in that respect Please send for my own—no shyster for me," he craftily concluded, naming a leader of the Lake City bar.

"I'm afraid our lesson of loaded dice is lost on the gentleman," said Curtis mildly, turning toward Inspector Gaylord. "Well, the lawyer can't get the money for a fee, or hide out the evidence against his client. He might have done both, if the skeptical gentleman hadn't been so ignorant of loaded dice as to use a loaded black-jack on me in the dark.

"He didn't dare let me remain in that vicinity, you see. That was fatal to his plans.

"He had already phoned to the garage for the auto—the time is right, because it was two o'clock when I went into his grounds and it took some fifteen minutes, so Jimmy says, for the chauffeur to arrive at the garage where Jimmy had already spotted the machine, and get out, with Jimmy cuddled up in the tire-rack.

"That's why he left the money in the bag with Henry's initials behind the post. When I came to half my senses—or maybe only a third of them—I tried to climb that post, and in falling I stuck my wrist through the handle where it was hidden in the shrubs."

Inspector Gaylord rose. His movement automatically disclosed the bag on the desk behind him. Schwartz trembled slightly when led down-stairs again.

In half an hour the noted lawyer arrived. He was very solicitous for Mr. Schwartz's welfare.

Immediately the legal light was ushered to the prisoner's cell, and went in alone. Almost immediately he came back screaming.

The turnkey ran to the cell door, then unlocked it speedily, and cut down the body of the client who had not yet paid his retainer.

Physicians applied the pulmotor, but failed to revive Jacob Schwartz after an hour of conscientious labor.

Subsequent investigation showed that Schwartz had beaten "the dice," chiefly because he had first woven a noose from his own silk shirt, which was tied to the upper bunk; then folded his blanket so that his feet would not sound on the floor in his death-struggle, and thus bring the turnkey to the cell.

Inspector Gaylord went back to the bureau in time to meet Jimmy McCann and Curtis, who had returned after breakfast.

Before he could impart the details of the new tragedy, confirmatory of their night's work, the young Irishman who had been an imp full of pranks eighteen years before, burst out with:

"Say, chief! Do you remember that grasshopper I put in the dray-horse's ear? Well, I got a new one, now."

"A new one?" echoed the inspector, glad of the momentary diversion. "Ah, you're the same bad boy, Jimmy."

"Worse!" grinned the other. "After following Dinny Sower's hind leg all night, I'm still full of energy. Guess what I've got here?" He extended two tightly clenched hands.

"More grasshoppers?" queried his superior with a wan smile.

"It's eight o'clock, chief. You told Fred and me to show you something, didn't you? Well, look!"

He suddenly exposed his open palms.

"Water-bugs!" he barked his triumph. "I got 'em to put down the coroner's back when Fred and I go over to the inquest. Corkscrew Morse says he'll put it in the first edition of the *News*, if I'm game!"

(The End.)

THE CALL-BOY SAYS

A grouch can be grouchiest without saying a word, just as a tom-cat emits his worst howls with close jaws.

From the Railroad Man's Magazine.

On the Editorial Carpet

Where We Gather in the Hut, Tell Our Troubles, Help One Another, and Sing Some Old Songs.

THEY called the engineer "*Hurry Up*" *Bill Bronson*, because, as the author explains, "He wanted his orders the minute he appeared at the window. He liked to shove his stylus across the flimsy, listen inattentively while the operator droned the orders, and then dash for his waiting cab, the flimsies already in his jumper pocket."

An interesting character, *Hurry-Up*. Just take in this picture and see if you don't want to know more of the subject who unwittingly sat for it:

"His was a rough-hewn face, not the face of a handsome man, but the face of a strong one. His black hair, cut very short, twisted close to his scalp, so that it defied brush and comb. His eyebrows were black, and they almost met between the eyes His cheek and chin were blue-black, where the razor had lately removed his beard His forehead was broad and his cheeks stood well away from his ample nose His big mouth had a habit of lifting at the left side, and that trick, with his steel-blue eyes, gave him a contemptuous air His chin spoke of dogged power. It was heavy There was a cleft in it like a scar He was six feet tall and weighed a hundred and ninety pounds."

Such a man is the hero of next month's novelette

"HURRY-UP" BILL—ENGINEER.

BY CHARLES WESLEY SANDERS,

Author of "Blow for Blow," "Mr. Tom Hill Assists," "On the Wings of a Warning," "Sleuth 'Morse' Plugs a Circuit," etc.

A RAILROAD MYSTERY NOVELETTE COMPLETE.

AND after you have read the story, you will say that *Bronson* was just the man to solve the railroad enigma that was put up to him Such, at any rate, was the opinion of *Tri-State Luke*, the sleazy gambler who had some undefined hold on weak young *Harry Baker*, brother of the girl *Bronson* loved And *Tri State's* opinion was shared in the end by *Crocker* and *Fordney*, the railroad detectives who—

But hold on, hold on! First thing you know I'll be giving away Mr Sanders's story, and that would never do Get hold of the next number, and learn all about the tangle from beginning to end

"AIN'T a railroad man the blamedest critter you-all ever had under observation?" remarks *Spike Malone*, that genial, adventurous philosopher "How so? Do you-all ever cherish the notion that you ever succeed in prying a real, shore-'nough rail away from where he can hear the stack barking or the wheels under the little red dog house behind the train counting off the rail-joints? Forget it! Listen, and let me unfold a tale of woe as long as a piece of string and if you-all don't rise and inform me I'm a wise *hombre* when I declare I'm plumb over-

joyed to get back into harness again, I shorely deem you a mental cripple nothing short of idiotic."

Whereupon *Spike* disburdens himself of a recital detailing his experiences in working on an interurban electric line that will make you howl with mirth. Next month

DID you ever stop to think that railroad rules - the multiplex regulations by which safe train-operation is insured -have not "just happened," like *Topsy*. Theodore Benton will tell you how they came to be, and how they gradually evolved from their first simple beginnings.

HOW the impact of human activity has driven transportation underground in a wonderful array of tunnels is dramatically told by Marlen Pew The author also describes in an absorbing manner such miracles of modern inventiveness as the App mechanical rock-worm, the Bennett tunneling machine, and the Karns reciprocating rock drill. In addition, Mr. Pew gives us a history of the tunnel and a glimpse as well into the future. Many illustrations

"SECTION-HANDS, brakemen, telegraph operators, freight rustlers, all have worked their way to the top of the railroad heap; but I never heard of but one yardmaster who was allowed to become president of a railroad," observes Charles Frederick Carter in discussing the yardmaster's job. "Fact is, the type of genius capable of being evolved into a successful yardmaster is so rare that the material simply cannot be wasted to make a mere president." Learn why by reading Mr Carter's brilliant article next month. It's both entertaining and informing

THE RAILROADER'S MAIL-BAG.

THE special terms employed, colloquially, in railroad work were listed in a series of articles entitled "Our Own Tongue," by Fred C. Files, which were published some years ago in this magazine. We have added so many readers since then, however, that a condensed list of these colloquialisms might fit in well; and just as this thought occurs, the postman delivers a letter from Mr. R B. Miller, containing exactly the glossary we had in mind.

Of course, Mr. Miller's list is not complete, we couldn't have printed it all if it had been, for the railroader's special vocabulary runs into hundreds, maybe thousands, of words Also, of course, many, if not all, of the terms are very familiar to our old readers, but even they may come upon a word here and there that they are not familiar with, while to our new readers as well as to those who are not in close personal touch with railroad work, the list, as it stands, will probably be quite illuminating Mr. Miller, you have the floor:

To the Editor.

I see in your magazine one of your correspondents desires to be enlightened upon the use of railroad nicknames, and I enclose you a list of same. R B Miller.

Jacksonville, Florida.

Mr Miller's list follows:

Conductor -con.
Engineer -hoghead
Brakeman -shack
Fireman—tallow-pot
Caboose—crummie or dog-house.
Engine—hog
Refrigerator—reefer.
Drawhead—lung
Packing—dope.
Superintendent—super.
To turn a switch—bending a rail.
Fusee—hot-dog
Orders—tissues
Switchman -snake
Switch-tower -cabin.
Coal -black diamonds.
Switch -gate
Repair yard—rip track.
New man—student.
Eating-house—beanery.
Meal-ticket—pie-card.
Flags or markers—rags.
Torpedo—gun
16-hour law—hog law.
Firing—picking diamonds.
Fast running—calling the jack or hooking her up.
Pay-car—pay-wagon
Pay-day—the ghost walks.
Cigarettes—pills or brain tablets.

Despatcher—detainer
Car inspector—car knocker
Section man—snipe or Jerry
Dismissed—canned or fired
A person not inclined to change positions—home guard
One who works long enough to make a stake to travel on—boomer
A man not belonging to his respective brotherhood—non-air
Black sateen, or blue, work-shirt—thousand mile
Go-ahead sign—highball.
Through or fast run—highball run
Small trunks—little country maidens.
Drummer trunk—jumbo
Baggage master—smasher
When the conductor agrees to carry one on his union card the free-rider is—squared out
Short distance—short haul
Long distance—long haul
Long train—long drag
Short train—short drag
Giving a signal—throwing it at him

BRAKEMAN PROBLEM SOLVED.

THE brakeman problem which appeared on page 700 of the April issue is restated and solved by our technical expert on page 105 of this number. By the way, you'll note that there are no new brain teasers this month. They were squeezed out; sorry. More next month, if luck holds.

"THE MONON WRECK."

A CORRESPONDENT gives us some interesting side-lights on the production, "The Monon Wreck," which we reprint by request on page 176. We regret that limitations of space prevent us from reprinting any more than the original set of verses:

In your February number you ask for a copy of "The Monon Wreck." By chance I saw the notice on January 11, 1917, the twenty-fifth anniversary of the wreck, and the poet had been inspired to write another on the same topic. As both were published, I send you clipping containing them, and also a review of the original poem.

The poet is a farmer who lives near Alamo, Indiana, and has in former times also taught school. He has published a volume of his poems at his own risk, and when he was trying to get me to buy a copy he informed me that "Jim Riley wrote pretty fair poetry, but *I* got him skinned a mile." So, you see, he appreciates his work.

It may be that you will have a number of copies sent you, but this is from the fountainhead and close to the poetic flow of J. Buchanan Elmore, commonly called "Jim."

Crawfordsville, Indiana

BALOLO.

DARN these scientific fellows, anyway. They'll get you if you don't watch out, even from as far away as the Amanzimtoti Institute. For instance:

In the December issue of your "mag," which I have come to me 'way out here in Africa, there is a very interesting article called "Worms Make Schedule Run." In it the author, Mr. Martin Wells, tells about the supposedly mysterious balolo worms, which appear strictly on time each year on the shores of Fiji and Samoa.

In his effort to make the article interesting, Mr. Wells tells us that this worm is a sort of Great Unknown. He asks, but does not answer, what it is and how it lives. He ends with a pile of question, all unanswered.

Yet we biologists are not wholly ignorant about these worms. We have even a popular article on them in "The Biology of the Seasons," a book by J. Arthur Thompson that is in many libraries, and deserves to be in all. Mr. Thompson calls these worms "palolo," and takes six pages to write interestingly on the significance of balolo.

Mr. Wells, however, forgot all the known facts. He does not tell us of the Atlantic balolo, which comes to Dry Tortugas, Florida, as regularly as its Pacific namesake does to Fiji. He forgets to tell us the color of balolo—green.

He tells us that the Fijians wait in darkness so as not to scare off the balolo, although moonlight is one of the causes of their rising.

Balolo are headless, organless worms, we are told by Mr. Wells. Wrong. They are the hind ends of well known marine worms, called *Eunice viridis* by the scientists.

These worms do not pair off or mate in the usual way. They throw off their hind ends, filled with eggs or sperms; for next year they grow another hind end. These ends are light; they rise to the surface. Coming on top into the air they burst open.

Eggs and sperms escape and unite. The fertilized eggs sink. The muscles in the hind ends go on acting after the end is cast off, exactly as Carrel and other Rockefeller Institute wizards have kept hearts alive and beating for days after removal from animals.

This, then, is your grand mystery. It doesn't "fear the daylight" at all. The supply of rising worm-ends gives out, P. D. Q.

"Where do they pass the remainder of the year?" asks Mr. Wells.

On the worm, as its tail end.

"Why do they pay heed only to the heavenly bodies in their comings?" he asks.

Because the worms need a combination of tide, light, and night, and change of season or climate, to be stimulated into throwing off their ends.

"On what does it feed?"

Balolo doesn't feed after it is thrown off by its parents.

"Where does it maintain the seat of the wee intellect that moves it to obey the common will of vast organized bodies of its kind?"

In the head of the worm that throws it off.

Arrah, go on, Mr. Wells! Next time you unearth a mystery for the RAILROAD MAN'S MAGAZINE, be sure it's a real one. Don't join the Nature-Fakers' Brigade.

S. G. RICH,
Late assistant in biology, New York University. Instructor in Nature Study, Amanzimtoti Institute.
Adams Mission Station P. O.,
Natal, South Africa.

FROM A TRAVELING MAN.

READERS of the RAILROAD MAN'S MAGAZINE are by no means exclusively railroad men, as the subjoined letter clearly indicates. On the contrary, we have many friends among the general public, especially that part of it who, like commercial travelers and entertainers, are generally on the move.

I have just finished with your February number. As a traveling man of some years' experience, I have naturally become a pronounced pessimist. Perusal of your magazine has done more to reconcile me to the continued and possibly unavoidable delays in transportation than all the statements of the ticket-agents, conductors, *et cetera*.

My first purchase of your publication was accidental, and I consider it a happy accident for me. I watch for each new issue with pleasure, and while I purchase many magazines, some at much higher prices, the RAILROAD MAN'S *invariably* gives me more information and pleasure than any other.

I have introduced many a traveler to the RAILROAD MAN'S MAGAZINE, and all whom I have asked have substantiated my opinion.

One thing that I ask of you: Maintain your present standard, strive to maintain it along the same lines as the past. To improve it greatly I believe impossible.

There are many thousands of travelers who will appreciate the RAILROAD MAN'S MAGAZINE as much as I do if it is called to their attention.

R. A. OGG.

24 East Seventh Street,
Oklahoma City, Oklahoma.

CAREERS OF SOME OLD GIRLS.

AGAIN Mr. Alger, a veteran of the throttle, puts us all under obligations by contributing this interesting and informing history of certain New England locomotives.

A recent article by Mr. Arthur Curran, entitled "Old Girls that Set the Styles in Engines," mentioned four engines built by William Mason for the Boston and Maine Railroad—the Norris No. 5, Bay State No. 17, Haverhill No. 27, and Camilla No. 30, and in another of his articles a picture of the Bay State appears.

As I have been an engineer on this road for nearly forty years, and have handled all of these engines and at least two of their predecessors, and all of the engines they succeeded on passenger-trains, I felt greatly interested in the articles. And I thought it might be of interest to some of the old-timers to know something of the lives of the "Old Girls that Set the Styles in Engines."

The engines that were scrapped when the new Masons came were all quite small, the Norris weighing 20 tons, Bay State 22, Haverhill 25, and Camilla 21. The Mason engines were assigned to express-trains running between Boston and Exeter, New Hampshire, and took the place of Blood engines built at Manchester, New Hampshire, the Norris taking the place of the Minerva No. 57, the Bay State on the train hauled by the Sachem No. 54, the Haverhill in place of Francis Cogswell No. 56, and the Camilla in the place of North Star No. 50.

All of the men who took these engines when new—Tom French, Len Marshall, Ed Freeman, and George Beals—have passed away.

The engines, after running on these trains, were one by one assigned to lighter trains, and finally to local passenger-trains. And so it became my privilege to run all of these locomotives, and for some little time the 30 was my regular engine, for names had disappeared from the engines.

The engines were not quick starters, but once under way were speedy travelers.

After the New Haven took control of the Boston and Maine, under the new system of renumbering, in 1910 or 1911, the engines bore the

numbers 702, 703, 704, 705 One by one they disappeared, the last one, as far as I know, being the 705, formerly Camilla No. 30. And she finished her railroad career on a work-train

Two of the engines that were succeeded by the Mason engines outlived their successors, the Francis Cogswell 56, and the Minerva 57 being in service in 1915, under the new numbers 643 and 644

But as I looked at the "blue-print" in the office this last week, I find that they, too, have joined the great majority, and that the "girls," their mothers, and grandmothers, together with the men who first ran them, are just a part of the railroad history of this country

J. E. Alger,
Engineer, Boston and Maine Railroad
3 Mount Vernon Street,
Reading, Massachusetts

HINT TO RAILROAD BOOSTERS.

MR. POMPEJI makes a good suggestion in the letter printed below, and one which will doubtless be acted upon as soon as the attention of the proper officials is called to it

I've been a very interested reader of the Railroad Man's Magazine so long that "the memory of man runneth not to the contrary," and admire it, as a whole, very much, both for the fiction and the technical articles.

As my work—doing one-night stands with a concert company—compels me to travel by railroad almost every day in the year all over the States and Canada, I've often thought it might be interesting, to some at least of your readers, if you were to publish from time to time a short description of new lines of road recently constructed location, length, ownership, amount of rolling stock, territory it will serve, and other items.

I think it would make interesting reading, and for some it would be helpful also

I would also suggest that an article on the policy of the Great Northern Railway in placing a painted poster reading, "See America First," on its freight-cars could be followed to their advantage by other roads having scenic attractions along their lines It would serve to advertise them far and wide to the people. For instance, the Chesapeake and Ohio Railroad cars could carry the Natural Bridge in Virginia, Oregon Short Line could carry Shoshone Falls, *et cetera*

I have personally heard quite a bit of comment at different times from persons on trains when they caught a glimpse of a "G. N." car with "Glacier National Park" and "See America First," and the goat (or is it a sheep?) and I should imagine that if a lot of the roads followed that policy, quite a large percentage of the traveling public, especially those on pleasure bent, would keep their eyes open to see how many places they could see illustrated

St. Elmo F. Pompeji,
1221 North Redfield Street,
Philadelphia, Pennsylvania

FLASHES FROM OUR READERS.

Enclosed please find check for one dollar to renew my subscription for the Railroad Man's Magazine. It's the best magazine on sale today. I cannot find any other one to equal it on good reading

L. E. Oesterling.
New Cumberland,
West Virginia

Enclosed please find check for one dollar for one year's subscription to the Railroad Man's Magazine I haven't missed a copy from 1907 until this number

W. R. Sparks.
Boone, Colorado.

ADDRESSES WANTED.

Readers of the Railroad Man's Magazine *who make requests to locate missing relatives through these columns must abide by the following:*

All requests must be written in ink and a complete description of the missing persons given, as well as full name and age

We will not publish these notices unless they are signed by the nearest living relative of the missing person, and we must be assured that every effort has been made to locate him through the various brotherhoods or associations to which he might belong

The person making the request must also give his or her complete address

INFORMATION is wanted of the whereabouts of Bruce C. Ashby, about 5 feet 10 or 11 inches in height, brown eyes; 27 years of age He left Houston, Texas, in 1915. Any information concerning him will be appreciated by his brother, James C. Ashby, U. S. S. Dubuque, care of Postmaster, New York

INFORMATION is wanted of the whereabouts of Roy H. Shibler, 5 feet 6 inches in height, light-brown, curly hair; blue eyes; 25 years old He left home four years ago to work on a structural-iron job. When last heard of he was in Muncie, Indiana, July, 1913. Any information concerning him will be greatly appreciated by his father, as his mother is seriously ill—E. P. Shibler, 731 Dewalt Avenue, S. W., Canton, Ohio

SONGS BY BARDS OF THE RAIL.

READERS have requested us to reprint the following poems:

"My Father Was an Engineer upon the Night Express."
"George Brown, the Engineer on the F., I and V."
"Old Joe Michael Was a Brave Engineer."

Can any of our readers supply us with transcripts? THE EDITOR

THE MONON WRECK.

(Reprinted by request; transcript by kindness of many readers.)

THE train is coming yonder, near,
The conductor calls the station clear;
Then outward move the busy throng
Ready for their stepping on

A signal waved says all is well,
And now we hear the parting bell.
The engineer opes the steam-chest throes,
Then swifter than a dart she goes

She glides along quite at her ease,
The swiftness causes a gentle breeze,
The wheels are creaking on frosty rails
Just like a bird she nimbly sails

One mile is passed and all is fun;
Two miles are made—the thing is done:
We are crossing over Sugar Creek Bridge,
And starting on the graded ridge

She strikes against a broken rail,
When all the cars it does derail,
And down they plunge into the deep,
A depth of more than sixty feet.

She rolled over just afore and aft,
The occupants turning like a shaft,
Before she reaches this mournful place,
Where each the other's soul embraced

A silence fell upon the crew,
As if they knew not what to do;
Then came sad lamenting cries
From the wreck of cars as fine as flies.

Tears are flowing thick and fast
From every one of the mangled mass,
And laying there we hear their prayers,
Asking the Lord to relieve their cares.

"Our Heavenly Father; wilt Thou draw near,
And hear our wo in supplication here?
Save us from this wreck of flame,
Where dearest comrades have been slain."

To the nearest town a messenger made,
While on the ground the dead are laid.
Oh, how terrible are the moaning sighs,
With pitiful appeals and last good-byes!

But there they lay on the crimson snow—
Their hearts have ceased to ebb and flow;
Quite as cold as a frozen chunk,
With a lady's heart upon a stump

Which was so far from her native home:
The ancient city of old Rome;
Never again to reach that clime,
And hear the bell of St. Peter's chime.

And now the flames begin to light
The demolished cars, which adds to fright,
For fear they all will burn to death
Oh, God, intervene and save the rest!

And yonder in the wreck I see
A man that's pinioned down by the knee,
And hear him calmly for to say:
"Cut, oh, cut my leg away!"

But a jackscrew from the mail caboose
Is now applied and lets him loose,
With many thanks to these brave men—
For greater heroes ne'er have been.

There was a mother frantic and wild,
Looking for her little child,
Which in her fright had run away
To the nearest home of that sad fray.

And as that mother paced to and fro,
She found some footprints in the snow,
And leaping onward with breathless bound,
Her loving daughter soon was found.

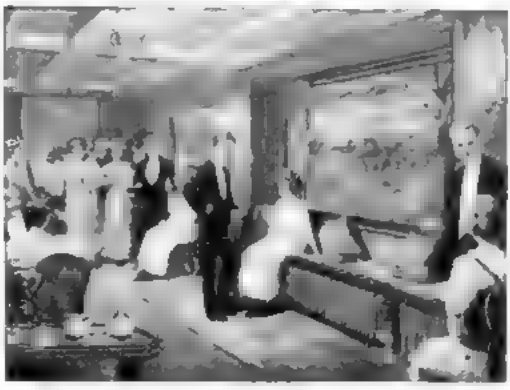
And such a meeting ne'er has been—
It moistened the eyes of the bravest men,
While in her arms she clasped so dear
The object of her joy and fear.

But four are dead—they speak no more:
The Savior has their souls in store,
Awaiting of the Judgment Day,
Where all is good, or sad dismay.

JAMES BUCHANAN ELMORE, 1892.

The Ideal "house-warming"

Everyone will be eager to see your new house. Your friends want to enjoy the cleverness of your very original plan and decorations. But they'll never forgive you or the architect if, with all its unique and artistic features, the place has the chill and draftiness of a barn. No matter what else is agreed upon, everyone now-a-days knows that no house can be a *home* without the genial, cozy, cleanly warmth of

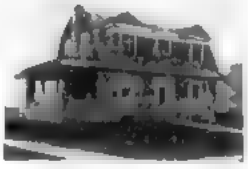


AMERICAN RADIATORS & IDEAL BOILERS

These outfits free you from ancient pests of hod-lifting, fire-poking, ash-sifting, coal-gas breathing, blackening, annual storing, repair bills, fire-risk, etc.

IDEAL SMOKELESS Boilers and AMERICAN Radiators save so much in coal and cleaning, in time and temper, in health and happiness, and without rusting or repairs, that they quickly repay their cost.

In all the world they have no equal—hence their use in over a million stores, schools, churches, offices, public buildings, *farm* and city homes, *old* or new, etc., at home and abroad.



A No. 8-99 IDEAL Boiler and 210 sq. feet of 38-inch AMERICAN Radiation, saving the owner $200 were gas to heat this cottage. At this price the outfit can be bought of any reputable steam fitter. This is but one of the many styles and sizes of IDEAL Boilers and AMERICAN Radiators which every building in climatic and other conditions demands.

The ideal bargain in heating

All real estate men and architects will tell you that IDEAL SMOKELESS Boilers and AMERICAN Radiators will attract and hold best tenants at 10% to 15% higher rental, or property sells quicker and owner gets back full cost of the heating outfits—which never wear out. Money put into these outfits is therefore *an investment*—not an expense. *Accept no substitute!*

To save heating-dollars to the end of your days, ask for *free*, valuable book: "Ideal Heating." Best possible time to buy. Write *today!*

$175 stationary Cleaner

Ask for catalog of ARCO WAND Vacuum Cleaner with iron suction pipe running to each floor. Sold on Easy Payments.

Showrooms and warehouses in all large cities

AMERICAN RADIATOR COMPANY

Write Department 23
816-822 S. Michigan Avenue, Chicago

FREE TRIAL OFFER

Be Your Own Salesman and Save $51—New Oliver Typewriters for $49

Let us send you a brand new Oliver Nine the world-famous typewriter —for five days' free trial. Keep it or return it.

That is our plan in a nutshell. Our new plan besides saving you $51 makes it easy for every one to convince himself of Oliver superiority. No red-tape no money down -no C. O. D No salesman to influence you. No need to ever pay $100 for a typewriter again.

But here is a warning—all advertisements for *brand new* Oliver Nines at $49 must be signed by the Oliver Typewriter Company.

Prices Cut in Two—and Why

With greater production and huge financial resources, the Oliver Typewriter Company is the pace setter

Its officials seek to relieve the public of a useless tax. In the past, it has cost $51 to sell typewriters through an expensive sales force —high rents for offices in 50 cities—and other frills All are wasteful from an economic viewpoint That is why Oliver Nines are shipped direct from the factory to the user—on free trial This permits us to wholesale machines to you for $49. You get the saving No middlemen with their tolls

This plan, we feel sure, is in keeping with modern demands All will welcome such a sincere effort to reduce the High Cost of Typewriters.

This Is Our Offer

No Money Down. No C. O. D. Easy Monthly Payments

Maker and user deal direct. You are your own salesman. You pay yourself the $51 Own this master typewriter at the rate of $3.00 per month

The Oliver Nine itself must convince you It is the greatest, the most durable, the most successful typewriter ever built No finer can be bought for any price. It is a twenty year development.

There is no need now to ever pay $100 again for a new typewriter The Oliver rebellion gives every one an opportunity to own an Oliver And at west time payments

This is the same machine used by the largest concerns It has all the latest improvements. For speed and fine workmanship, it can't be beat

If after trial of 5 days, you are not satisfied—ship it back at our expense

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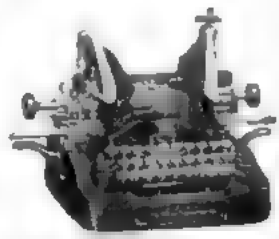

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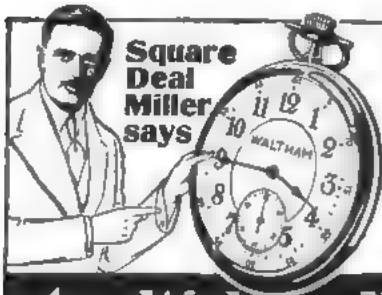

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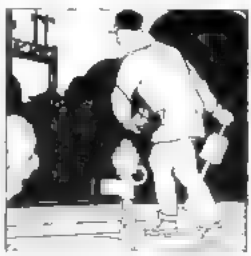

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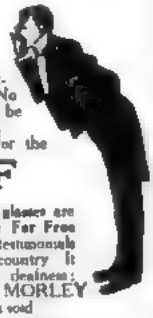

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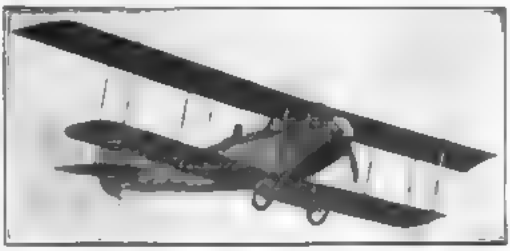

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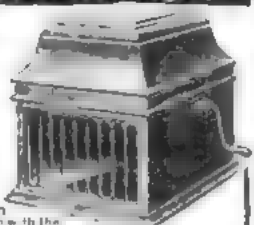

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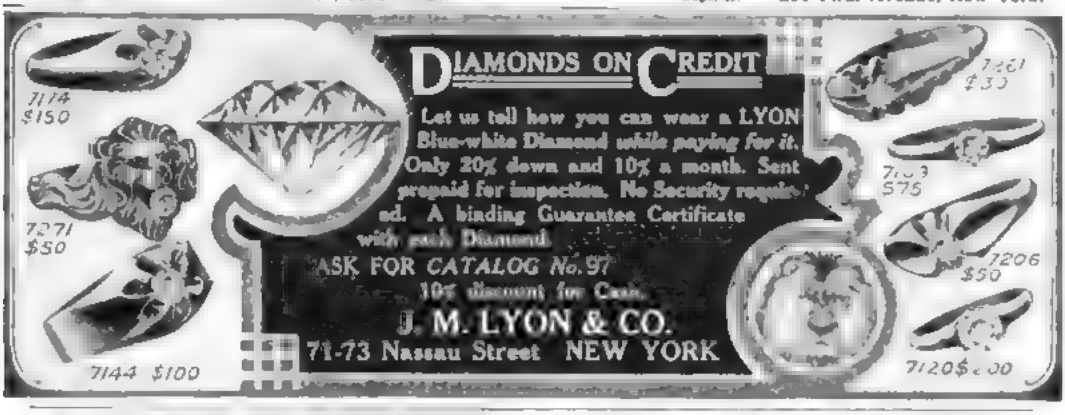

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BM 9

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We might well call it "The History of *The Sun*," or "The Romance of *The Sun*," or "A Condensed Biography of New York Journalists since the Beginning of Small Things," or "The History of New York Journalism Covering Three-Quarters of a Century," or "A Look Backward at the High Lights and Big Wigs of New York in Antebellum Days." It could appear under any one of these titles, as it covers all of them in flash-light and snapshot in "The Story of *The Sun*."

The Sun was founded in 1833, and was the pioneer one-cent paper of the world that stuck. All earlier efforts at one-cent journalism were of short life. Among those who failed where young Ben Day succeeded, was none other than the great Horace Greeley. But Ben Day, the young printer from New England, did much more than pioneer a new idea in journalism; he gave us a new journalism.

"The Story of *The Sun*" shows Ben Day expanding from the boy printer—and he was little more than a boy when he founded *The Sun*—to the keen journalist with whetted native wit and broadened vision. It tells of the struggles and final triumphs in journalism of three contemporaries of Ben Day who were destined to leave their footprints big on the sands of time. They were James Gordon Bennett, Sr., the founder of the New York *Herald*, A. S. Abell, the founder of the Baltimore *Sun*, and Horace Greeley, the founder of the New York *Tribune*.

These three newspapers came after *The Sun* had pioneered the way. "The Story of *The Sun*" graphically pictures the simple beginning of Ben Day's tiny newspaper of only four pages, scarcely bigger than so many pages of MUNSEY'S MAGAZINE—a newspaper which was destined to become in prestige and power one of the three or four greatest in the world.

As the story unfolds we reach the period of Mr. Dana's administration, and it was the hand of Charles A. Dana that wrote genius all over the pages of *The Sun*, and sent it everywhere into the homes of culture and intellectuality.

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This "Story of *The Sun*" begins in the May MUNSEY. There will probably be a sharp demand for the magazine. It is, therefore, advisable that you place your order for the May MUNSEY with your newsdealer now. Failing to do this, you may not get the opening chapters of "The Story of *The Sun*."

FRANK A. MUNSEY

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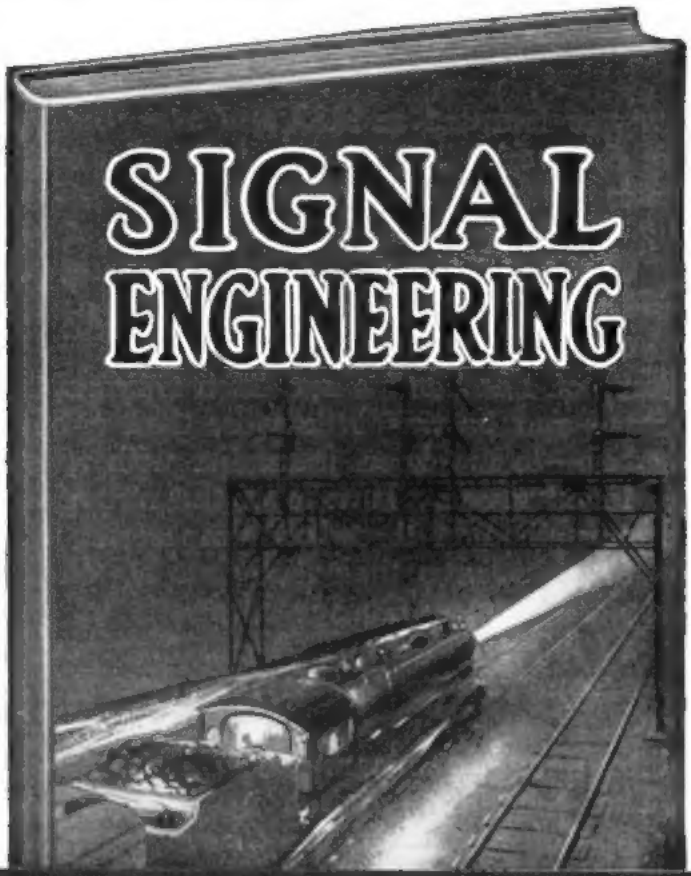

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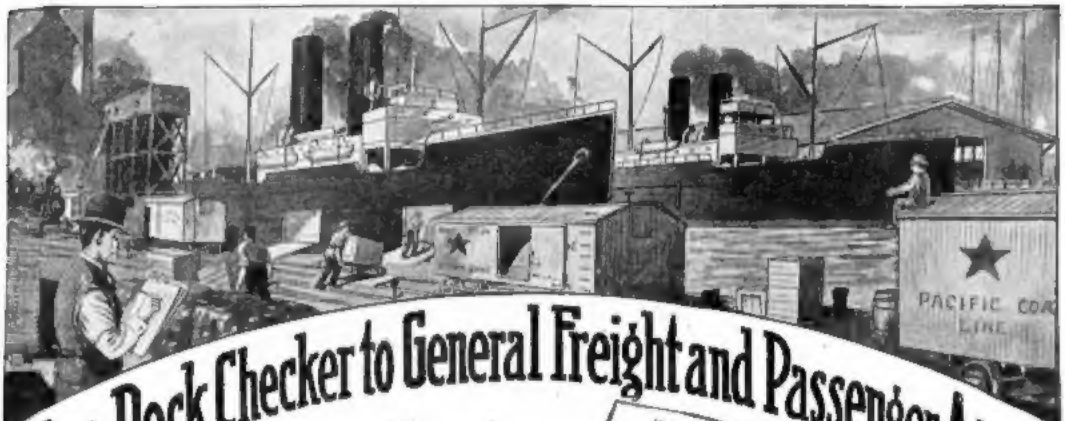

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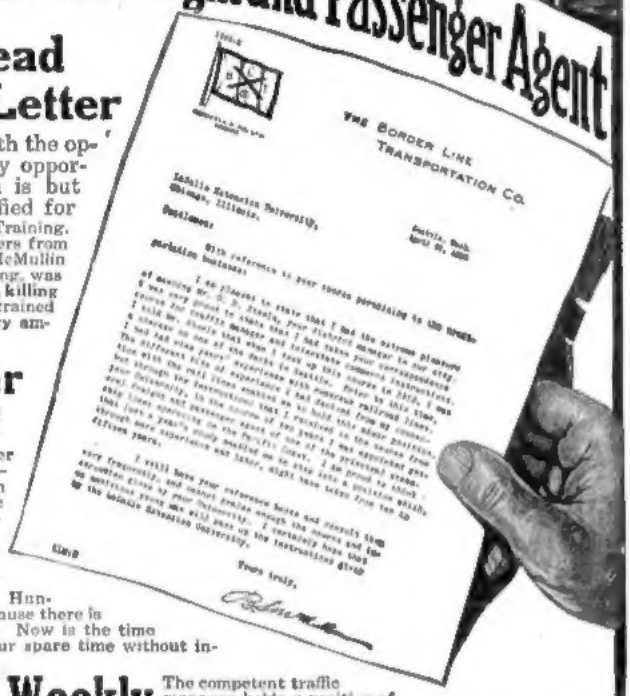
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With reference to your course pertaining to the traffic business:

I am pleased to state that I had the extreme pleasure of meeting Mr. [illegible] Steele, from Station [illegible] and [illegible] Station, and I had taken quite a few [illegible] your course prepared. I was very proud to shake hands with Mr. Steele, for I had taken quite a few [illegible] I told Mr. Steele that when I had started railroad in this line, I was a checker on one of the docks here in this station, and had not been there very long before I realized that I was destined for something better. The difficulty was I had started railroad in this line with the evil idea that experience was the only thing necessary to hold down a position. But through the instructions I had received from your institution, I was enabled to [illegible] my position with the railroad company that I started in as a checker, and [illegible] to the position of [illegible] of the docks. I was promoted to [illegible] position of [illegible] agent of the Pacific Coast Line, a position which I have occupied for two years. I am proud to state that I owe a position which, although not a princely one, is a position which has been taken from me by others who have had many years more experience than I have, all because I had taken a course with your institution.

I still have your reference books and consult them very frequently, and intend studying [illegible] and [illegible] course with your institution, as I certainly have [illegible] information [illegible] your instructions given [illegible] the LaSalle Extension University.

Yours truly,

[illegible]

Dock

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